



City of Philadelphia Municipal Retirement System

**Experience Study Results
for July 1, 2016 – June 30, 2021**

Produced by Cheiron

April 2022

TABLE OF CONTENTS

<i>Section</i>		<i>Page</i>
	Letter of Transmittal	i
Section I	Board Summary	1
Section II	Analysis of Economic Assumptions	5
Section III	Analysis of Demographic Assumptions	14
 <i>Appendices</i>		
Appendix A	Current Actuarial Assumptions.....	48
Appendix B	Alternative Actuarial Assumptions.....	55

LETTER OF TRANSMITTAL

April 25, 2022

City of Philadelphia Municipal Retirement System
Two Penn Center Plaza – 16th Floor
Philadelphia, Pennsylvania 19102-1721

Dear Board Members:

At your request, we have completed an experience study of the City of Philadelphia Municipal Retirement System (Retirement System). 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 five-year period from July 1, 2016 through June 30, 2021 in compliance with the Pennsylvania Municipal Pension Plan Funding Standard and Recovery Act (Act 205) Chapter 2, Section 2.01.

This report presents the results of our study as well as alternative assumptions for consideration to be employed for the July 1, 2022 Actuarial Valuation.

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 report has 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 set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries we meet the Qualification Standards, as defined by the American Academy of Actuaries, to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This experience study report was prepared solely for the City of Philadelphia Municipal Retirement System for the purposes described herein. This actuarial valuation report is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

Sincerely,
Cheiron



Anu Patel, FSA, MAAA, EA
Principal Consulting Actuary



Brett Warren, FSA, MAAA, EA
Consulting Actuary



Karen Zangara, FSA, MAAA, EA
Principal Consulting Actuary



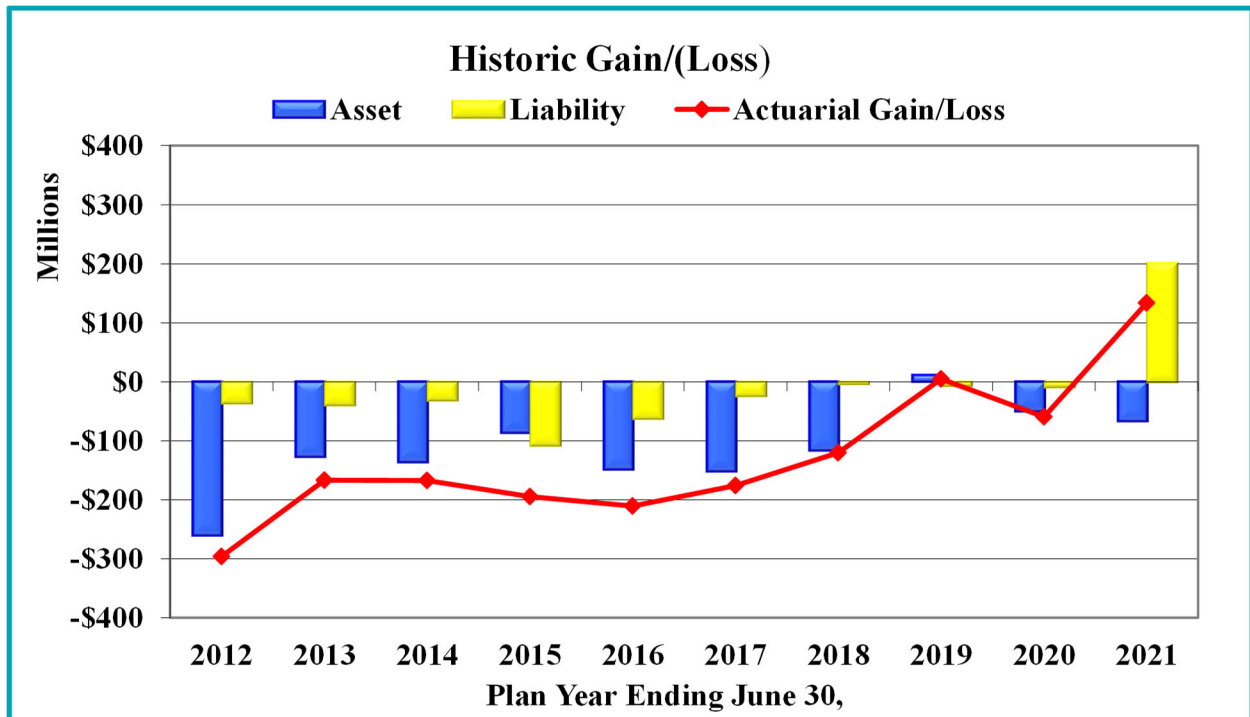
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

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 and are not necessarily only driven by the most recent events. That is particularly important considering the major economic impact and consequential changes in membership behavior due to the COVID-19 pandemic which may be short term in nature. The purpose of this experience study is to evaluate whether or not the current assumptions adequately reflect the long-term expectations for the City of Philadelphia Municipal Retirement System (the System), and if not, to provide alternatives that might be needed. 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 increase rate (salary scale), 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 yellow bars represent the annual liability experience gains or losses (G/(L)).



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION I – BOARD SUMMARY

In summary, the graph indicates that for nine 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. However, during the latest five years that are including in this most recent study, there were relatively small liability losses from 2017 through 2020 offset by a large gain in 2021 primarily from the one-time reduction in liability due to the updates in the census data for credited service after adjustments for breaks in service. Removing the one-time \$164 million liability gain in 2021, there was a net loss on liabilities relative to our assumptions of approximately \$6 million (on average, \$1 million per year) or less than 0.01% of the average annual actuarial liability of \$11.7 billion over the five-year period. There have generally been gains and losses that have partially offset each other over this period. The five years of experience during this study period suggests the liability experience in aggregate to be relatively in line with the assumptions.

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 in nine of the ten years. The average annual investment loss over the ten-year period was \$114 million or 2.2% of the average annual market value of assets of \$5.3 billion over this ten-year period. These losses are primarily due to the market downturn in 2009 which wasn’t fully recognized until 2018. The investment assumption has been reviewed and changed almost annually. The investment return assumption has been reduced from 8.10% in 2011 to 7.45% in 2021. The data supports this policy as well as continual review and reduction of the long-term investment/discount rate assumption.

The alternative assumptions that were selected by the Retirement Board will be effective for the July 1, 2022 actuarial valuation which determines the FYE 2024 Minimum Municipal Obligation, City Funding Policy and Revenue Recognition Policy contributions.

On the following page, we present Table I-1 summarizing all keys findings and alternative assumptions arising from this study.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION I – BOARD SUMMARY

**Table I – 1
Current and Alternative Economic and Demographic Assumptions
(All Municipal and Police and Fire Employees)**

	Current Assumption	Alternative Assumption
<u>Economic</u>		
Inflation	2.75%	No Change
Investment Return/Discount Rate	7.45%	Continue to review each year
Salary Increase Rate	Salary scale by age	Generally, decreases for Municipal at later ages and increases for Uniformed at earlier ages
Payroll Growth	3.30%	No Change
Expenses	Increases annually by 3.30%	No Change
<u>Demographic</u>		
Retirement Rates	Retirement rates by age	Minor adjustments in the rates for 1987 Plans; extended retirement rates for reduced early retirement
Termination Rates	Termination Rates by Age	Minor adjustments in the rates for all Plans
Disability Rates	Disability Rates by age	Minor adjustments in the rates for all Plans
Active Mortality Rates (Pre-Retirement)	RP-2014 Employee projected to 2021 <ul style="list-style-type: none"> • Municipal: rates adjusted 110% (males) and 115% (females) • Uniformed: Blue collar rates adjusted by 85% (males/females) 	Pub-2010(B) Employee projected to 2025 <ul style="list-style-type: none"> • Municipal: General rates adjusted 109% (males) and 126% (females) • Uniformed: Safety rates adjusted by 118% (males) and 122% (females)
Healthy Retiree Mortality Rates (Post-Retirement)	RP-2014 Healthy Annuitant projected to 2021 <ul style="list-style-type: none"> • Municipal: rates adjusted 127% (males) and 119% (females) • Uniformed: Blue collar rates adjusted 115% (males/females) 	Pub-2010(B) Healthy Annuitant projected to 2025 <ul style="list-style-type: none"> • Municipal: General rates adjusted 109% (males) and 126% (females) • Uniformed: Safety rates adjusted by 118% (males) and 122% (females)
Disabled Mortality Rates (Post-Disabled)	RP-2014 Disabled Annuitant projected to 2021 <ul style="list-style-type: none"> • Municipal: rates adjusted 95% (males/females) • Uniformed: rates adjusted 80% (males/females) 	Pub-2010 Disabled Annuitant projected to 2025 <ul style="list-style-type: none"> • Municipal: General rates adjusted 108% (males) and 105% (females) • Uniformed: Safety rates adjusted 135% (males)

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION I – BOARD SUMMARY

Table I – 1 (continued)		
Current and Alternative Economic and Demographic Assumptions (All Municipal and Police and Fire Employees)		
	Current Assumption	Alternative Assumption
<u>Miscellaneous Demographic</u>		
Family Composition	<ul style="list-style-type: none"> • 70% of active/50% of non-active members assumed married • Male spouses assumed four-years older than female spouses 	<ul style="list-style-type: none"> • 40% of non-active members assumed married • No changes to active married or spouse age difference
Disability: Ordinary vs Service Connected	<ul style="list-style-type: none"> • Municipal: 65% Ordinary / 35% Service • Uniformed: 25% / 75% 	No Change
Death: Ordinary vs Service Connected	<ul style="list-style-type: none"> • Municipal: 98.5% / 1.5% • Uniformed: 92% / 8% 	No Change

The alternative assumptions were provided separately to the Board for consideration and opportunity to provide feedback regarding the experience study observations and anticipated long-term trends to support the alternative assumptions. In addition, the estimated cost impact and financial implications were communicated and reviewed with the Board in March 2022.

The balance of this report presents the rationale for the alternatives presented above. We present detailed analysis and exhibits supporting the alternative economic assumptions (Section II) and demographic assumptions (Section III).

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

Economic Assumptions

We considered the following to be "economic" assumptions in our analysis:

1. Inflation
2. Investment Return/Discount Rate
3. Salary Increase
4. Payroll Growth
5. Administrative Expenses

Both the investment and salary increase assumptions are interrelated with the inflation rate. The rate of investment return consists of two components; the "real rate" of return and the inflation component. Similarly, the rate of salary increase is separated into different components: the inflation rate, a merit increase (seniority) and sometimes there is a component set aside for "productivity" gains.

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

While this assumption does not have a direct impact on the valuation, it is an underlying building block of the investment and salary scale assumptions and needs to be reviewed within this study. The current rate of 2.75% is still within the generally accepted range used by other public plans. Although this rate is higher than the recent experience through 2021 (see table next page) and lower than the inflation rates available for the first few months of 2022 when this report was being completed, this can be anticipated to remain a reasonable estimate for the underlying long-term building block for the other related economic assumptions.

A. Current Assumption

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 2.75%.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

B. Experience

1. Historical Experience in General

Based on the Consumer Price Index for all Philadelphia-Wilmington-Atlantic City Urban Consumers, Table II-1 on the next page shows the inflation rates for the past 20 years. The current 2.75% rate of inflation exceeds the regional rate of inflation over the last five years (as shown in Table II-1) but it is generally accepted that this is a historically unusual period for this measurement.

Table II-1 Philadelphia/Wilmington/Atlantic City Average (CPI-U)	
Year Ending June 30,	Increase in CPI-U
2002	2.08%
2003	1.83%
2004	4.38%
2005	3.43%
2006	4.44%
2007	1.57%
2008	5.13%
2009	-2.01%
2010	1.91%
2011	2.80%
2012	1.25%
2013	1.51%
2014	1.77%
2015	0.17%
2016	0.12%
2017	0.70%
2018	1.89%
2019	2.11%
2020	0.11%
2021	4.85%
2002 - 2021	1.99%
2012 - 2021	1.44%
2017 - 2021	1.92%

The inflation rates have declined significantly over the past 20 years, especially in the past fifteen years due in part to the Federal Reserve’s decision to keep treasury rates low to stimulate the economy. In the year ending June 2021 inflation broke from this long-term trend with an annual rate of 4.85%. Inflation continues to come in higher than in recent history in the months after June 2021 and prior to the issuance of this report in April 2022. This short-term deviation bears monitoring but does not require immediate revision to expectations. Often those deviations are followed by offsetting deviations in the opposite direction. The assumptions used in actuarial valuations are long-term in nature and are not necessarily driven by the most recent events considering the major economic impact of the COVID-19 pandemic.

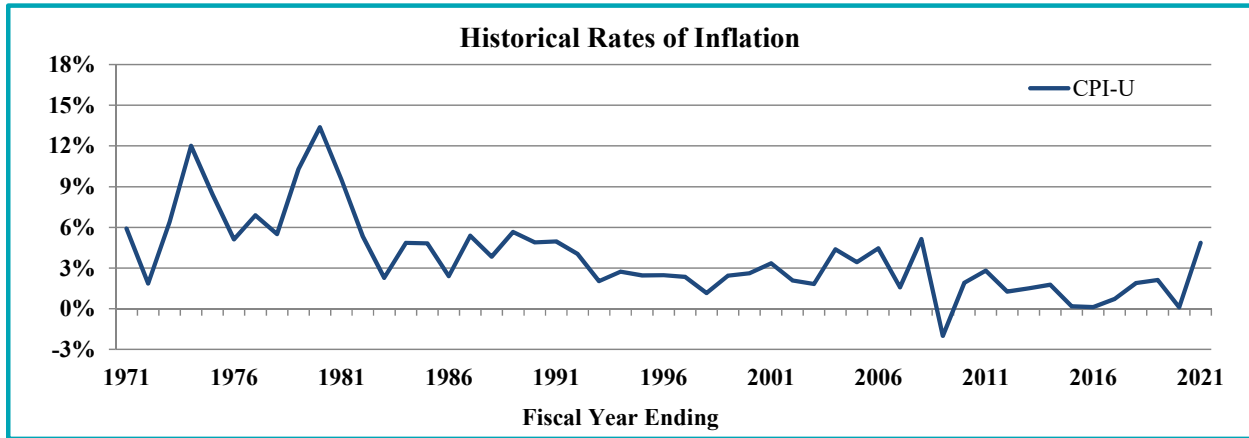
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

2. Market Expectations

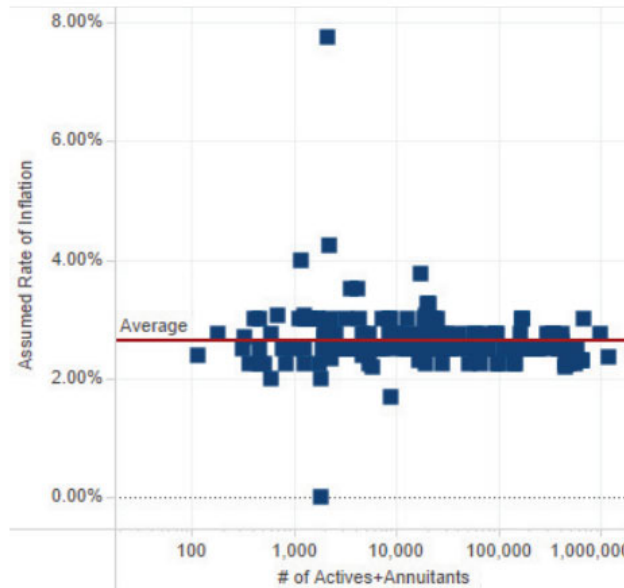
While the recent market data implies a lower rate prior to 2021, the historic data shows much more volatility in the rates and continues to support the current assumption. Over the last 30 years, the geometric average inflation rate has been 2.2%.

Chart II-1



The *National Conference on Public Employee Retirement Systems* (NCPERS) February 2022 Public Retirement Systems Study includes the following graphic of respondents' inflation assumptions:

Chart II-2



This shows that the current 2.75% assumption is slightly higher than the average inflation assumptions used among the 156 systems that responded to this study, with 2.7% as the average. The 2.7% average is unchanged from the prior year NCPERS study.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

2. Investment Return/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 net of expenses. In the short-term, a higher discount rate results in lower liabilities which implies lower required 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.

A. Current Assumption

The Retirement Systems’ assets are assumed to earn 7.45% net of expenses.

B. Experience

1. Historical Experience in General

Table II-2 provides the rates of investment returns experienced by the 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.

Table II-2 Investment Returns on Market Value of Assets	
Year Ending June 30,	Return
2012	0.18%
2013	10.94%
2014	15.70%
2015	0.29%
2016	-3.17%
2017	13.08%
2018	9.01%
2019	5.66%
2020	1.53%
2021	28.42%
Compounded Averages up to July 1, 2021	
Last 5 Years (2017 - 2021)	11.17%
Last 10 Years (2012 - 2021)	7.81%

The investment returns on a five- and ten-year basis are higher than the current assumption primarily due to the significantly high returns for 2021. 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 System cost increases.

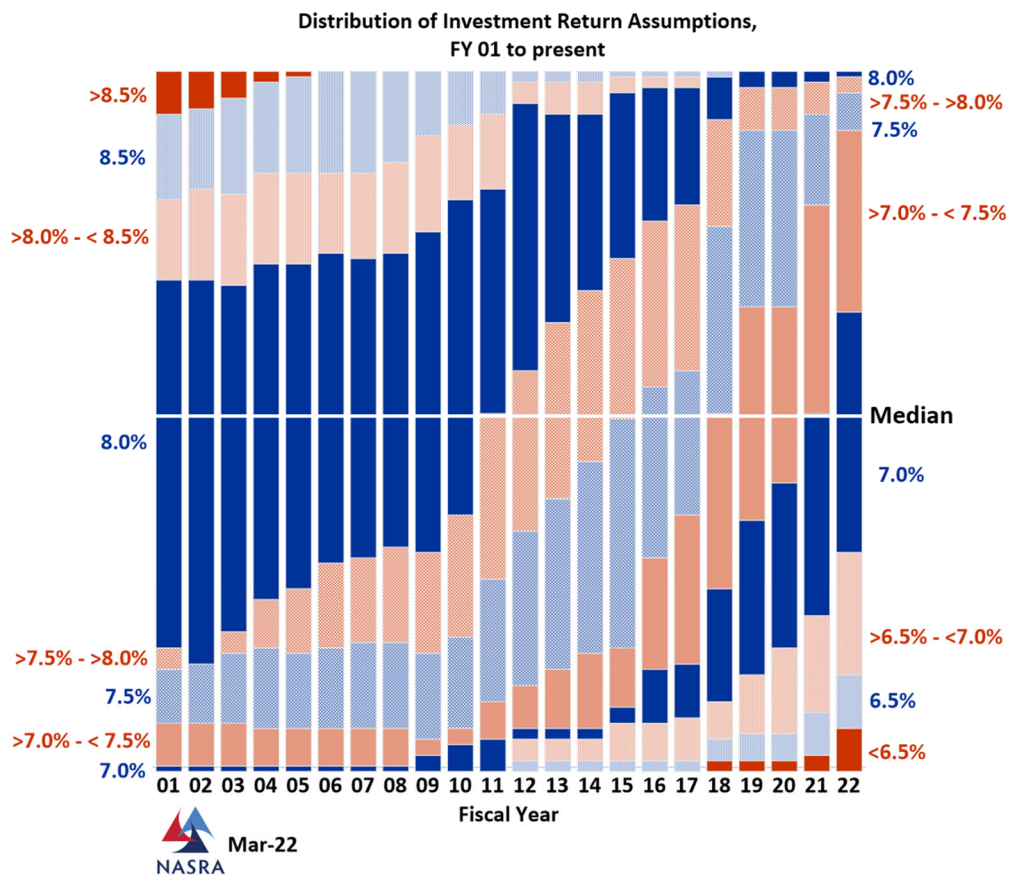
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

2. Other Public Sector Plans

The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The Public Fund Survey covers 131 large retirement systems, including other Pennsylvania systems. Chart II-3 shows the change in the distribution of assumptions since 2001. There has been a general movement over the last decade to reduce the discount rate used in actuarial valuations. The median assumption is now 7.00% and the number of plans using a discount rate of 7.00% or lower has increased significantly.

Chart II-3



C. Alternative

The current investment return assumption is 7.45%. While this rate is within the range of a variety of acceptable investment return assumptions, it is appropriate to continue to look at decreasing this assumption as a basis for the Board’s preference to reduce investment risk and exposure to market volatility as reflected in the long-term discount rate. We support continual consideration of bringing this rate down to be in alignment with the asset allocation and increasing the likelihood future investment returns will achieve the assumption.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

3. Salary Increase

The salary increase rate represents the year over year increase in pay for continuing actives.

A. Current Assumptions

All Municipal and Police and Fire Employees

The current salary increase assumption for all Municipal and Police and Fire employees is an age-based assumption.

B. Experience

The average salary increase over the testing period is 4.97% for Municipal and 4.78% for Police and Fire participants. If we compare the total salary increases compared to the salary increase that we expected, we can see that the actual increases were slightly lower for Municipal and slightly higher for Uniformed. The Table II-3 below shows the total salary increase rate experienced by the System during the five-year study period.

Table II-3						
Average Salary Increases - Data from Fiscal Years 2016 through 2021						
Age	Actual Experience		Current Rates		Delta	
	Municipal	Police and Fire	Municipal	Police and Fire	Municipal	Police and Fire
<20	44.25%	11.92%	20.00%	20.00%	24.25%	-8.08%
20-24	13.93%	13.31%	18.00%	11.00%	-4.07%	2.31%
25-29	8.44%	8.98%	10.00%	7.00%	-1.56%	1.98%
30-34	6.39%	5.42%	7.00%	5.00%	-0.61%	0.42%
35-39	5.20%	4.30%	5.75%	4.25%	-0.55%	0.05%
40-44	4.57%	3.79%	5.00%	4.00%	-0.43%	-0.21%
45-49	4.03%	3.59%	4.60%	3.50%	-0.57%	0.09%
50-54	3.48%	3.46%	4.35%	3.30%	-0.87%	0.16%
55-69	3.48%	3.31%	4.10%	3.00%	-0.62%	0.31%
60+	3.30%	3.11%	3.85%	3.00%	-0.55%	0.11%
Total Average						
Increase	4.97%	4.78%	5.30%	4.41%	-0.33%	0.37%

C. Alternatives

All Municipal and Police and Fire Employees

Based on the data, we provide an alternative assumption with slightly lower salary increase rates for Municipal after age 35 and generally higher salary increase rates for Uniformed prior to age 35.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

D. Results

The following graphs show the age-based salary increase rate that might be applied for these groups.

Chart II- 4

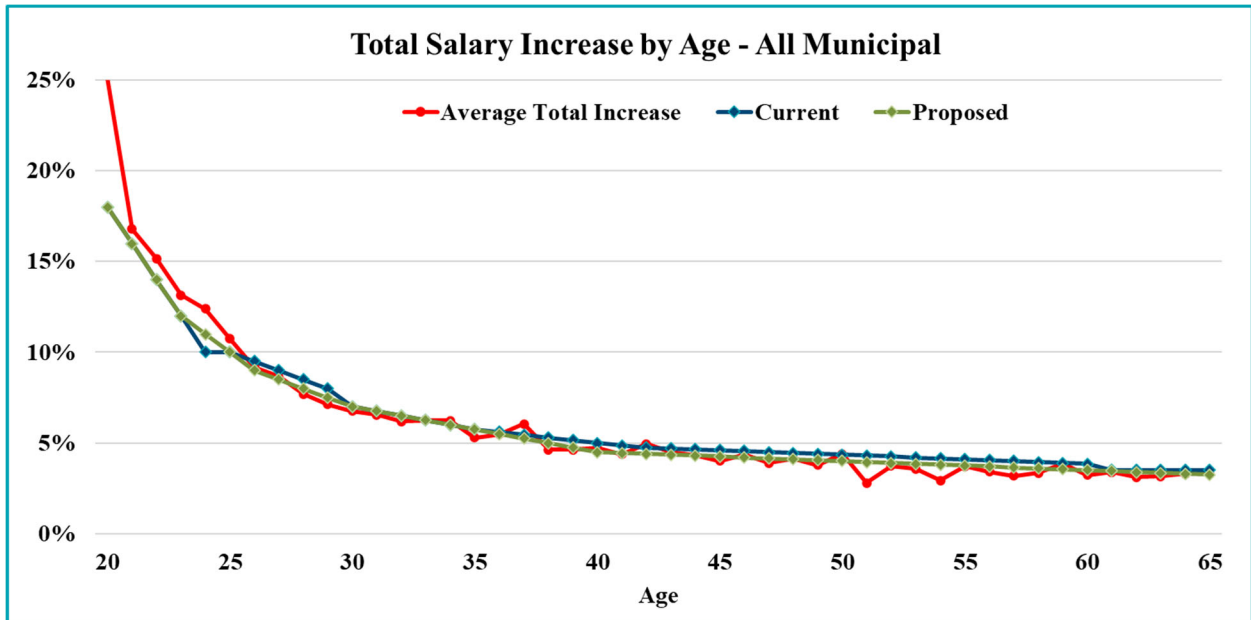
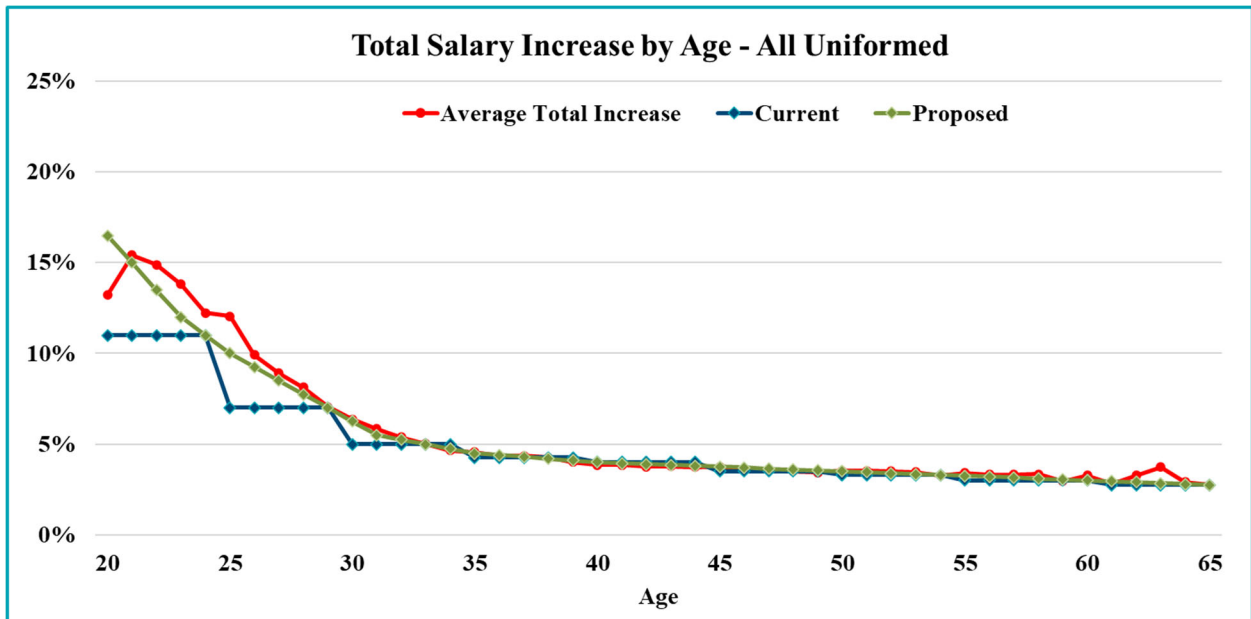


Chart II- 5



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

4. Payroll Growth Rate

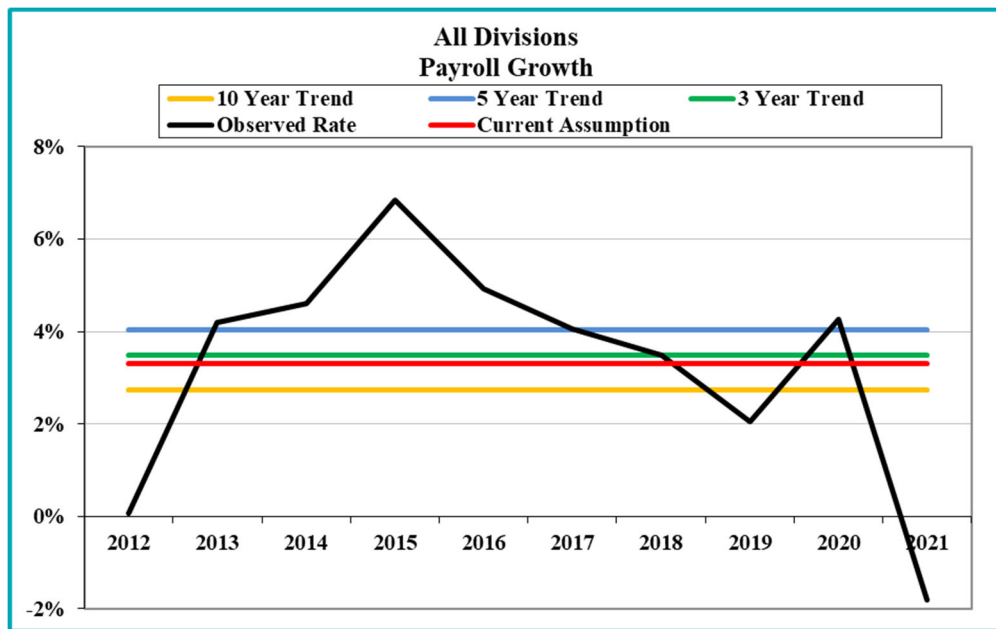
A. Current Assumptions

The Systems’ total payroll growth assumption is currently 3.3%. This assumption represents the assumed growth in payroll, which includes not only the continuing active participants’ year over year increases, but also the participants employed for only a short period of time. It is a reflection of both payroll growth and number of employees covered by the System.

B. Experience

The Systems’ total payroll growth has fluctuated since 2012, especially in 2021 due to the impact of the pandemic in FYE 2021. Due to these fluctuations, averages are typically used to review this assumption. The average of the three- and five-year trend (running averages over the last ten years) are slightly higher than the current assumption while the ten-year trend is below the assumption. The following graphs show the experience, the three, five, and ten-year trends, and the current assumption.

Chart II- 6



C. Alternatives

While it may still be high compared to the long-term averages, it is a reflection of reductions in total workforce during the beginning and end of the period shown which we expect to level off in the future. At this time, this assumption may continue to be appropriate reflecting long-term expectations of the City. This assumption impacts the roll forward of the expected expenses and our projection modeling.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION II – ANALYSIS OF ECONOMIC ASSUMPTIONS

5. Administrative Expenses

A. Current Assumption

The expense assumption is based on the average of the administrative expenses from the past year incurred by the plan. This amount is then rolled forward to the following year based on the payroll growth assumption.

B. Alternative

This assumption is reviewed and updated every year based on the System’s experience, so no change is provided at this time.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Demographic Assumptions

In Section III we present similar information with respect to the demographic assumptions. We present the key findings of our experience review of the demographic assumptions used by the System, including alternative assumptions for consideration.

Demographic assumptions are used to predict membership behavior, including rates of retirement, termination, disability, and mortality. These assumptions are based primarily on the historical experience of the System, with some adjustments where future experience is expected to differ from historical experience and with deference to standard tables where the System's experience is not fully credible and a standard table is available.

The demographic assumptions included in this review are:

1. Retirement
2. Termination from Active Employment (Other than Death, Disability, or Retirement)
3. Disability
4. Mortality (Active, Retired Healthy, and Retired Disabled)
5. Family Composition
6. Disability: Ordinary vs Service Connected
7. Death: Ordinary vs Service Connected

For each of the first four sets of assumptions noted above, we determined the ratio of the actual number of decrements for each membership group compared to the expected number of decrements (A/E ratio or actual-to-expected ratio). If the assumption is perfect, this ratio will be 100 percent, and any recommended assumption change should move from the current A/E ratio towards 100 percent unless future experience is expected to be different than the experience during the period of study.

The tables and graphs in each section compare three items:

1. The number of participants eligible to have the occurrence (such as retirement),
2. The number of participants expected to have the occurrence (such as retire) based on the current assumptions (illustrated in blue), and,
3. The number of participants expected to have the occurrence based on the proposed alternative assumptions (illustrated in green)
4. The “actual to expected” ratios for items 2 and 3.

The alternative assumptions generally bring the ratios closer to one, which means the number of participants we expect for an occurrence under the alternative assumptions is closer to the actual number of participants who had the occurrence. If the proposed assumption changes are identical for the current assumptions (i.e., there are no proposed changes), then the blue line will not be visible on the graphs.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF 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 trend.

We calculate the 90 percent confidence interval, which represents the range within which the true decrement rate during the experience study period falls with 90 percent confidence. (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 and to account for the past experience represented by the current 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 percent although this is rarely the case. Generally, alternative assumption changes should increase the r-squared statistic compared to the current assumption making it closer to 100 percent unless the pattern of future decrements is expected to be different from the pattern experienced during the period of study. Alternative assumptions that have a small change in the r-squared statistic away from 100 percent may be acceptable if the A/E ratio moves closer to 100 percent.

Also, we aggregate participants for the demographic assumption review when the data at individual ages is no longer credible. 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. Therefore, 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 due to external factors at the time.

When applying the assumptions to the data at the end points, 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.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

1. Retirement

A. Current Assumptions

All Municipal Employees

Normal Retirement assumptions for City Municipal employees under Plan 67 start at age 55, regardless of service. Under Plan 87, Normal Retirement starts at age 60 with ten years of service with the exception of those in the Elected group, which start at age 55 with ten years of service. Additionally, under Plan 87, Early Retirement starts at age 52 with ten years of service and is unreduced if the employee has least 33 years of credited service, regardless of age.

All Police and Fire Employees

Normal Retirement assumptions for City Police and Fire employees under Plan 67 start at age 45, regardless of service. Under Plan 87, Normal Retirement starts at age 50 with ten years of service. Additionally, under Plan 87, Early Retirement starts at age 40 with ten years of service and is unreduced if the employee has at least 25 years of credited service, regardless of age.

The current retirement rates for all employee groups vary based on age with no early retirement assumption. Once a Municipal employee, or a Police and Fire employee, reaches age 70, we assume 100% probability of retirement.

B. Experience

All Municipal, Police and Fire Employees

Overall, for Municipal and the Police and Fire employees in all Plans, the actual retirements during the study period were higher than expected. For the retirement assumption review for participants 70+, there is insufficient data to review the retirement rates at individual ages. This indicates that most of the participants are retired by 70 and therefore, we excluded the data for participants 70+ for the retirement assumptions review and assumed 100% retirement for all plans (see the Results section outlined in item D below).

For the 1967 Plans, the number of active members continues to decrease as members retire resulting in very few active members remaining. Since there is not enough data to enable us to discern a change in trend, we have proposed no changes to the current assumptions. Because there are no proposed assumption changes, the blue line (i.e.: current assumption) will not be visible on the graphs.

For the 1987 Plans, there are a limited number of members who have retired under reduced early retirement. In the past, due to the limited amount of credible data, we have assumed these members have waited to retire until they have reached normal retirement age which partly accounts for the higher actual retirements. However, for this study, we have extended the early retirement rates to age 52 for Municipal Plan 1987 and age 45 for Uniformed Plan 1987.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Finally, for 1987 Uniformed, there were a significant number of participants who retired in 2021 (including DROP enrollments) which has skewed actual retirements higher due to the COVID-19 pandemic. For this group, we show two charts. Chart III-R4 shows the total retirement experience including all years of the study and Chart III-R5 shows retirements excluding July 1, 2020 through June 30, 2021 retirement experience. The data shows that the experience is in line with the current assumptions if we exclude the unusually high pandemic related retirement activity. Future trends should be analyzed before making significant changes to this assumption.

C. Alternatives

All Municipal, Police and Fire Employees

We propose extending the retirement rates for reduced early retirement for Police, Fire and Municipal in the 1987 Plans.

The alternative retirement rates are provided in the next section.

D. Results

The following Table III - 1 provides the average age at retirement for those new retirees during the year by Division over the past five years. The average age for “All Retirements” is the average age at retirement for all retirees in the system as of July 1, 2021 (regardless of their date of retirement).

Table III-1			
Average Retirement Ages for New Retirees Each Year			
Year Ending June	Municipal	Police and Fire	
30	Division	Division	Total
2017	61.8	57.6	60.8
2018	61.7	57.8	60.9
2019	62.6	57.4	61.5
2020	63.2	58.1	62.0
2021	62.7	58.2	61.7
All Retirements*	60.2	53.1	57.9

*Average retirement age for all retirees as of July 1, 2021

This table shows us that overall the average retirement ages are slowly increasing over the period.

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. Also, the tables show the calculation of actual-to-expected (A/E) ratios and the r-squared statistic.

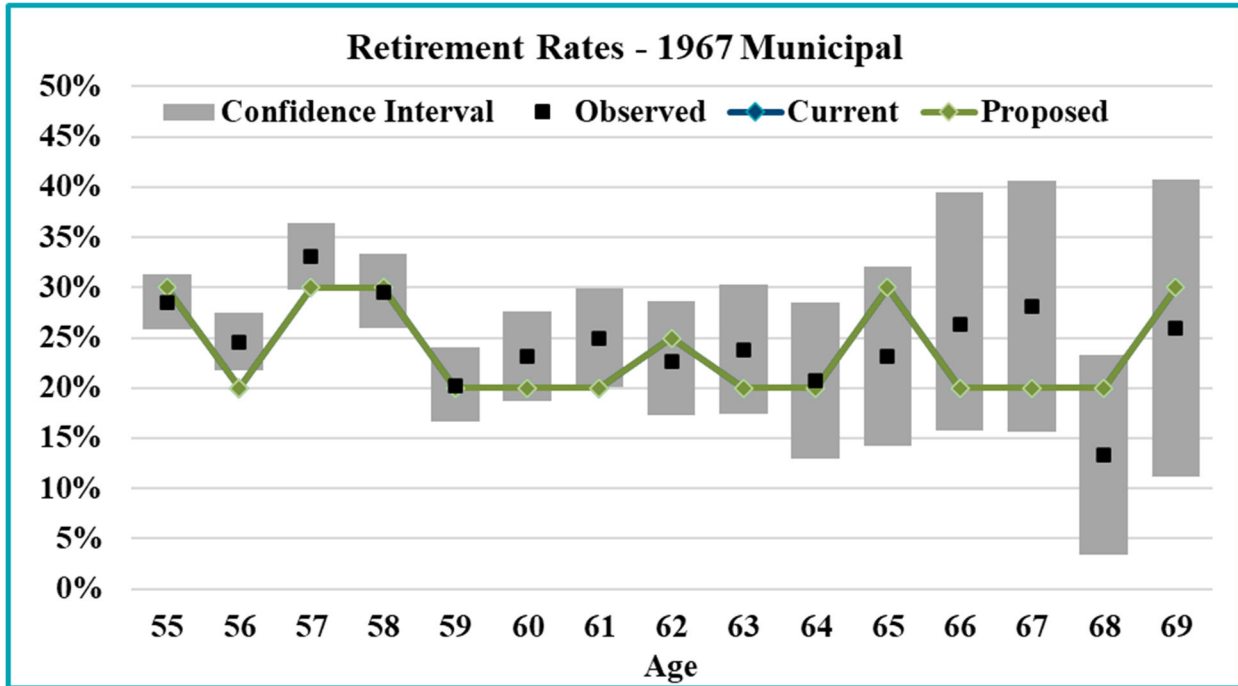
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-R1

Retirement Rates - 1967 Municipal									
Age	Exposures	Retirements			Retirement Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
55	732	209	220	220	28.6%	30.0%	30.0%	95%	95%
56	611	150	122	122	24.5%	20.0%	20.0%	123%	123%
57	543	180	163	163	33.1%	30.0%	30.0%	110%	110%
58	423	125	127	127	29.6%	30.0%	30.0%	99%	99%
59	312	63	62	62	20.2%	20.0%	20.0%	101%	101%
60	246	57	49	49	23.2%	20.0%	20.0%	116%	116%
61	204	51	41	41	25.0%	20.0%	20.0%	125%	125%
62	150	34	38	38	22.7%	25.0%	25.0%	91%	91%
63	109	26	22	22	23.9%	20.0%	20.0%	119%	119%
64	77	16	15	15	20.8%	20.0%	20.0%	104%	104%
65	56	13	17	17	23.2%	30.0%	30.0%	77%	77%
66	38	10	8	8	26.3%	20.0%	20.0%	132%	132%
67	32	9	6	6	28.1%	20.0%	20.0%	141%	141%
68	30	4	6	6	13.3%	20.0%	20.0%	67%	67%
69	27	7	8	8	25.9%	30.0%	30.0%	86%	86%
TOTAL	3,590	954	904	904	26.6%	25.2%	25.2%	106%	106%
R-squared			99%	99%					

Chart III-R1



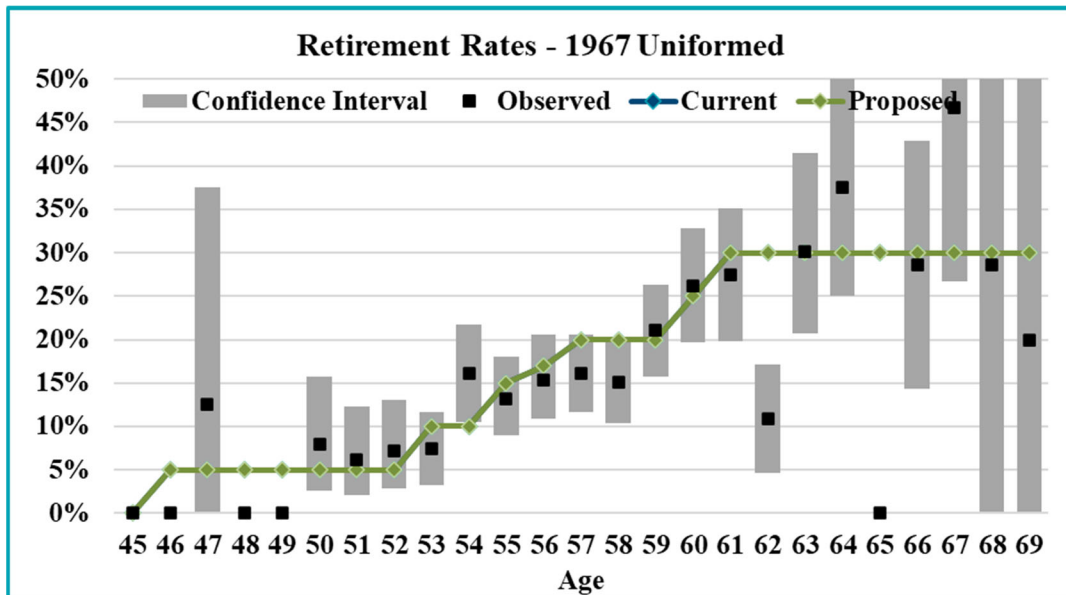
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-R2

Retirement Rates - 1967 Uniformed									
Age	Exposures	Retirements			Retirement Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
45	0	0	0	0	N/A	10.0%	10.0%	0%	0%
46	2	0	0	0	0.0%	5.0%	5.0%	0%	0%
47	8	1	0	0	12.5%	5.0%	5.0%	250%	250%
48	9	0	0	0	0.0%	5.0%	5.0%	0%	0%
49	19	0	1	1	0.0%	5.0%	5.0%	0%	0%
50	38	3	2	2	7.9%	5.0%	5.0%	158%	158%
51	49	3	2	2	6.1%	5.0%	5.0%	122%	122%
52	69	5	3	3	7.2%	5.0%	5.0%	145%	145%
53	94	7	9	9	7.4%	10.0%	10.0%	74%	74%
54	124	20	12	12	16.1%	10.0%	10.0%	161%	161%
55	144	19	22	22	13.2%	15.0%	15.0%	88%	88%
56	156	24	27	27	15.4%	17.0%	17.0%	90%	90%
57	180	29	36	36	16.1%	20.0%	20.0%	81%	81%
58	173	26	35	35	15.0%	20.0%	20.0%	75%	75%
59	152	32	30	30	21.1%	20.0%	20.0%	105%	105%
60	122	32	31	31	26.2%	25.0%	25.0%	105%	105%
61	91	25	27	27	27.5%	30.0%	30.0%	92%	92%
62	64	7	19	19	10.9%	30.0%	30.0%	36%	36%
63	53	16	16	16	30.2%	30.0%	30.0%	101%	101%
64	32	12	10	10	37.5%	30.0%	30.0%	125%	125%
65	16	0	5	5	0.0%	30.0%	30.0%	0%	0%
66	21	6	6	6	28.6%	30.0%	30.0%	95%	95%
67	15	7	5	5	46.7%	30.0%	30.0%	156%	156%
68	7	2	2	2	28.6%	30.0%	30.0%	95%	95%
69	5	1	2	2	20.0%	30.0%	30.0%	67%	67%
TOTAL	1,643	277	302	302	16.9%	18.4%	18.4%	92%	92%
R-squared			90%	90%					

Chart III-R2



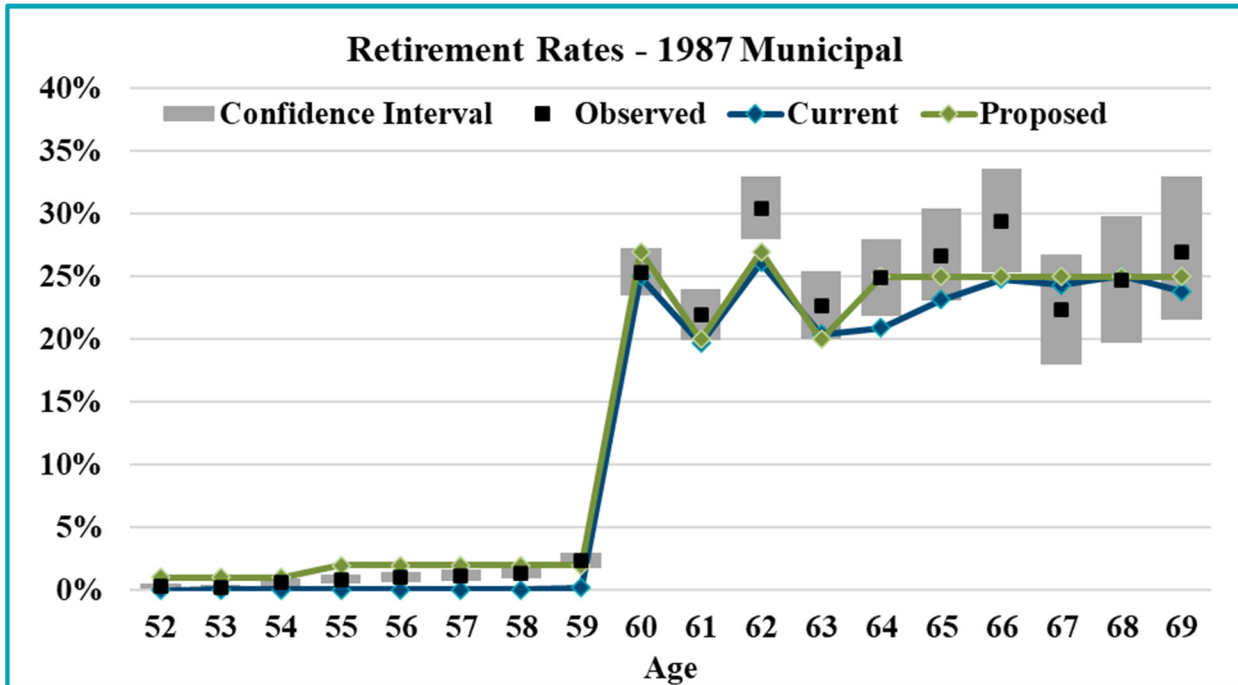
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-R3

Retirement Rates - 1987 Municipal									
Age	Exposures	Retirements			Retirement Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
52	1,854	6	0	19	0.3%	0.0%	1.0%	1395%	32%
53	1,648	4	1	17	0.2%	0.1%	1.0%	444%	24%
54	1,695	11	1	17	0.6%	0.0%	1.0%	1618%	64%
55	1,758	15	1	35	0.9%	0.1%	2.0%	1471%	42%
56	1,895	20	2	38	1.1%	0.1%	2.0%	1250%	52%
57	1,654	20	1	33	1.2%	0.1%	2.0%	1471%	60%
58	1,638	22	1	33	1.3%	0.1%	2.0%	1692%	66%
59	1,583	38	4	32	2.4%	0.2%	2.0%	1016%	118%
60	1,469	372	367	397	25.3%	25.0%	27.0%	101%	94%
61	1,128	248	222	226	22.0%	19.7%	20.0%	112%	110%
62	884	269	231	239	30.4%	26.1%	27.0%	116%	113%
63	649	147	132	130	22.7%	20.4%	20.0%	111%	113%
64	550	137	115	138	24.9%	20.9%	25.0%	119%	100%
65	394	105	91	99	26.6%	23.1%	25.0%	115%	107%
66	316	93	78	79	29.4%	24.8%	25.0%	119%	118%
67	250	56	61	63	22.4%	24.3%	25.0%	92%	90%
68	198	49	50	50	24.7%	25.1%	25.0%	99%	99%
69	167	45	40	42	26.9%	23.8%	25.0%	113%	108%
TOTAL	19,738	1,657	1,399	1,684	8.4%	7.1%	8.5%	118%	98%
R-squared			99%	98%					

Chart III-R3



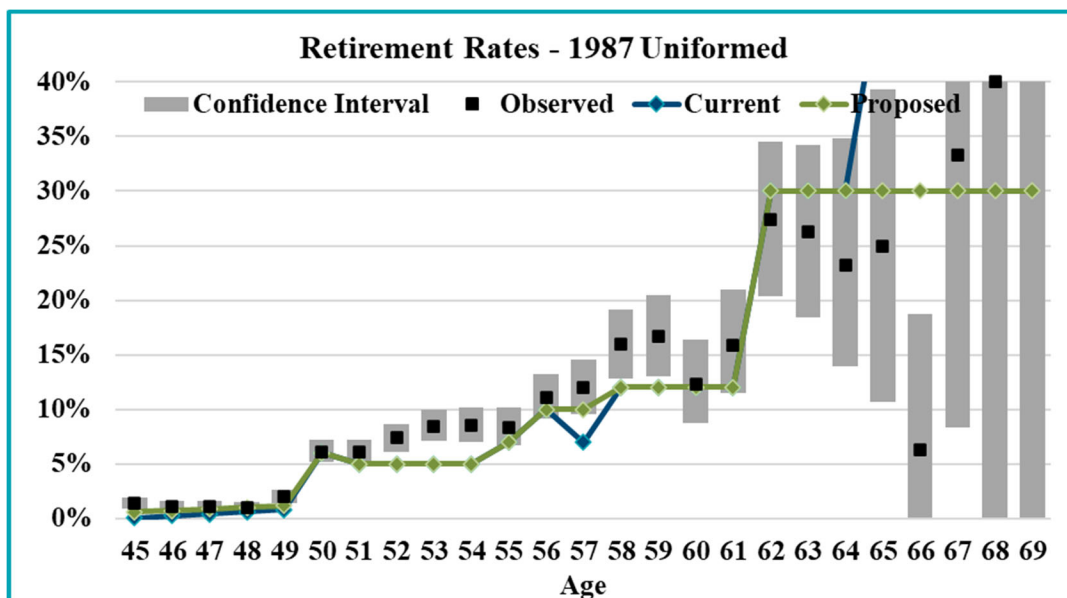
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-R4

Retirement Rates - 1987 Uniformed									
Age	Exposures	Retirements			Retirement Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
45	1,292	18	1	7	1.4%	0.0%	0.6%	3529%	241%
46	1,390	15	3	10	1.1%	0.2%	0.7%	490%	158%
47	1,477	16	6	12	1.1%	0.4%	0.8%	267%	129%
48	1,516	15	9	15	1.0%	0.6%	1.0%	163%	98%
49	1,539	31	12	18	2.0%	0.8%	1.2%	257%	175%
50	1,503	92	90	90	6.1%	6.0%	6.0%	102%	102%
51	1,335	81	67	67	6.1%	5.0%	5.0%	121%	121%
52	1,196	88	60	60	7.4%	5.0%	5.0%	147%	147%
53	1,027	87	51	51	8.5%	5.0%	5.0%	169%	169%
54	866	74	43	43	8.5%	5.0%	5.0%	171%	171%
55	731	61	51	51	8.3%	7.0%	7.0%	119%	119%
56	603	67	60	60	11.1%	10.0%	10.0%	111%	111%
57	460	55	32	46	12.0%	7.0%	10.0%	171%	120%
58	351	56	42	42	16.0%	12.0%	12.0%	133%	133%
59	269	45	32	32	16.7%	12.0%	12.0%	139%	139%
60	195	24	23	23	12.3%	12.0%	12.0%	103%	103%
61	157	25	19	19	15.9%	12.0%	12.0%	133%	133%
62	113	31	34	34	27.4%	30.0%	30.0%	91%	91%
63	76	20	23	23	26.3%	30.0%	30.0%	88%	88%
64	43	10	13	13	23.3%	30.0%	30.0%	78%	78%
65	28	7	14	8	25.0%	50.0%	30.0%	50%	83%
66	16	1	8	5	6.3%	50.0%	30.0%	13%	21%
67	12	4	6	4	33.3%	50.0%	30.0%	67%	111%
68	5	2	3	2	40.0%	50.0%	30.0%	80%	133%
69	2	1	1	1	50.0%	50.0%	30.0%	100%	167%
TOTAL	16,202	926	704	736	5.7%	4.3%	4.5%	132%	126%
R-squared			87%	91%					

Chart III-R4



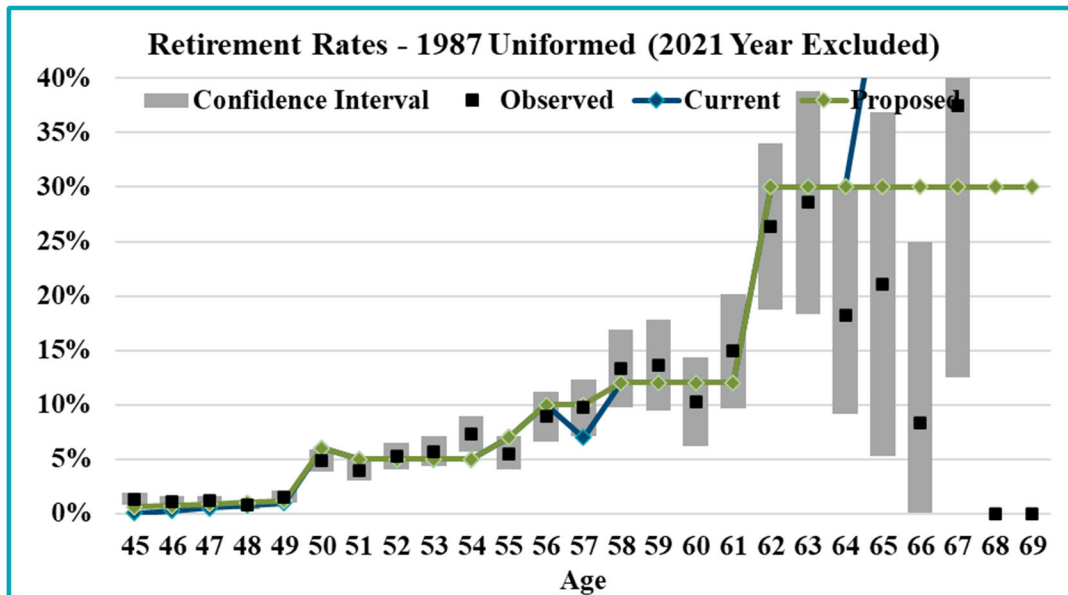
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-R5

Retirement Rates - 1987 Uniformed (2021 Year Excluded)									
Age	Exposures	Retirements			Retirement Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
45	1,055	14	1	6	1.3%	0.0%	0.6%	2745%	226%
46	1,155	12	3	8	1.0%	0.3%	0.7%	392%	149%
47	1,223	14	6	11	1.1%	0.5%	0.9%	233%	133%
48	1,236	10	9	13	0.8%	0.7%	1.0%	109%	79%
49	1,262	19	12	14	1.5%	1.0%	1.1%	158%	133%
50	1,164	57	70	70	4.9%	6.0%	6.0%	82%	82%
51	1,033	41	52	52	4.0%	5.0%	5.0%	79%	79%
52	914	48	46	46	5.3%	5.0%	5.0%	105%	105%
53	776	44	39	39	5.7%	5.0%	5.0%	113%	113%
54	672	49	34	34	7.3%	5.0%	5.0%	146%	146%
55	551	30	39	39	5.4%	7.0%	7.0%	78%	78%
56	438	39	44	44	8.9%	10.0%	10.0%	89%	89%
57	340	33	24	34	9.7%	7.0%	10.0%	139%	97%
58	255	34	31	31	13.3%	12.0%	12.0%	111%	111%
59	191	26	23	23	13.6%	12.0%	12.0%	113%	113%
60	146	15	18	18	10.3%	12.0%	12.0%	86%	86%
61	114	17	14	14	14.9%	12.0%	12.0%	124%	124%
62	91	24	27	27	26.4%	30.0%	30.0%	88%	88%
63	49	14	15	15	28.6%	30.0%	30.0%	95%	95%
64	33	6	10	10	18.2%	30.0%	30.0%	61%	61%
65	19	4	10	6	21.1%	50.0%	30.0%	42%	70%
66	12	1	6	4	8.3%	50.0%	30.0%	17%	28%
67	8	3	4	2	37.5%	50.0%	30.0%	75%	125%
68	2	0	1	1	0.0%	50.0%	30.0%	0%	0%
69	1	0	1	0	0.0%	50.0%	30.0%	0%	0%
TOTAL	12,740	554	534	557	4.3%	4.2%	4.4%	104%	99%
R-squared			85%	90%					

Chart III-R5



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

2. Termination from Active Employment

A. Current Assumptions

All Municipal, Police and Fire Employees

Current termination assumptions for all Municipal, Police and Fire employees are age based. Under Municipal Plans, the rates are set to zero at ages 70 and above reflecting the point in time when retirement assumptions are expected to take over for turnover. Under Uniformed Plans, the rates are set to zero at ages 55 and above accounting for the service requirement for retirement.

B. Experience

All Municipal, Police and Fire Employees

Overall, the termination rates were generally in line with the current assumptions for the Municipal Plans and higher than expected for the Uniformed Plans. Similar to the retirement assumption, the Uniformed Plans may have been impacted by the pandemic more significantly resulting in higher terminations. Therefore, while the most recent experience supports an increase in termination rates for the Uniformed Plans, the alternative adjustments are tempered based upon the expected future behavior of the active participants.

C. Alternatives

All Municipal, Police and Fire Employees

We propose increasing the termination rates to some extent for the Uniformed Plans, but we do not suggest a large change due to the impact of terminations during the pandemic which may be short term in nature. Also, we propose making minor adjustments to the Municipal Plans.

The next section shows the proposed assumptions for both Municipal and Police and Fire employees over the study period.

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. Also, the tables show the calculation of actual-to-expected (A/E) ratios and the r-squared statistic.

In the Municipal Plans, the data shows minor adjustments to termination rates compared to the current assumption which was based on prior experience and the Uniformed Plans show slight increases in the termination rates. The alternative assumption changes the assumed rates of termination to be more in-line with the confidence intervals and the aggregate A/E ratio to be closer to 100%.

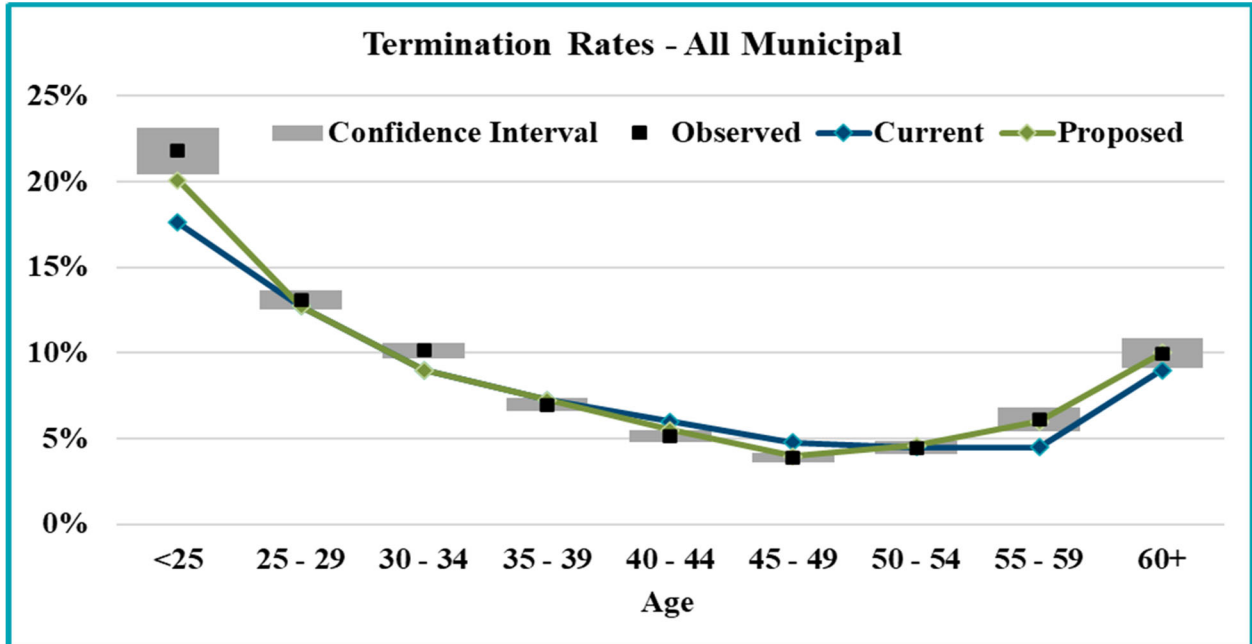
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-T1

Termination Rates - All Municipal									
Age	Exposures	Terminations			Termination Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
<25	2,456	535	433	493	21.78%	17.62%	20.07%	124%	109%
25 - 29	9,487	1,244	1,208	1,208	13.11%	12.73%	12.73%	103%	103%
30 - 34	12,473	1,267	1,123	1,123	10.16%	9.00%	9.00%	113%	113%
35 - 39	11,965	836	867	867	6.99%	7.25%	7.25%	96%	96%
40 - 44	11,478	594	690	633	5.18%	6.01%	5.52%	86%	94%
45 - 49	12,697	497	608	508	3.91%	4.79%	4.00%	82%	98%
50 - 54	7,303	327	329	337	4.48%	4.50%	4.61%	100%	97%
55 - 59	3,084	189	139	185	6.13%	4.50%	6.00%	136%	102%
60+	3,404	340	306	340	9.99%	9.00%	10.00%	111%	100%
TOTAL	74,347	5,829	5,702	5,694	7.84%	7.67%	7.66%	102%	102%
R-squared			94%	97%					

Chart III-T1



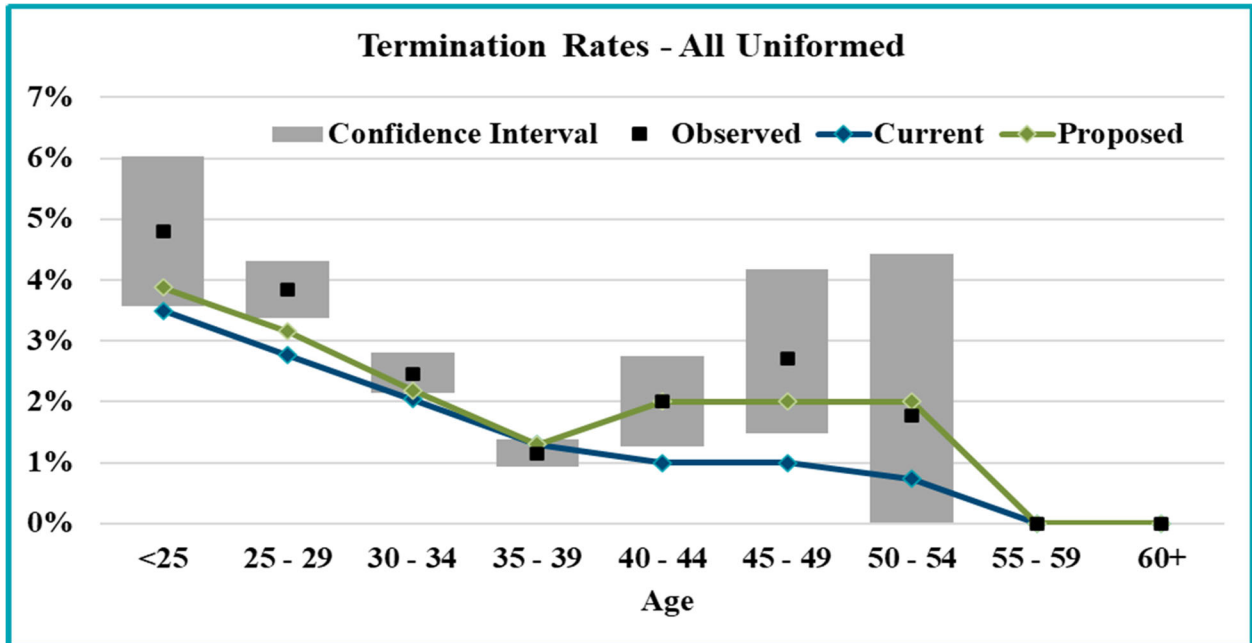
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-T2

Termination Rates - All Uniformed									
Age	Exposures	Terminations			Termination Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
<25	812	39	28	32	4.80%	3.50%	3.88%	137%	124%
25 - 29	4,483	172	124	141	3.84%	2.77%	3.15%	139%	122%
30 - 34	5,803	143	119	127	2.46%	2.04%	2.19%	121%	112%
35 - 39	6,038	70	78	78	1.16%	1.30%	1.30%	89%	89%
40 - 44	947	19	9	19	2.01%	1.00%	2.00%	201%	100%
45 - 49	407	11	4	8	2.70%	1.00%	2.00%	270%	135%
50 - 54	113	2	1	2	1.77%	0.74%	2.00%	240%	88%
55 - 59	26	0	0	0	0.00%	0.00%	0.00%	0%	0%
60+	13	0	0	0	0.00%	0.00%	0.00%	0%	0%
TOTAL	18,642	456	364	408	2.45%	1.95%	2.19%	125%	112%
R-squared			89%	91%					

Chart III-T2



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

3. Disability

A. Current Assumptions

All Municipal, Police and Fire Employees

Current assumptions for all Municipal, Police and Fire employees are based on age. The rates are set to zero to reflect retirement eligibility at age 60 and above for all Plans.

B. Experience

All Municipal, Police and Fire Employees

The study shows that the actual number of male and female participants becoming disabled for the Municipal Division was slightly higher than expected while being slightly lower than expected for the Police and Fire Division. There are also some members who have become disabled at age 60 and above due to a service-connected disability.

C. Alternatives

All Municipal, Police and Fire Employees

We propose minor adjustments to the assumptions for the all Plans.

In addition, due to the experience of some participants becoming disabled for Police and Fire Divisions after age 60, the alternative assumptions provide rates for this group.

D. Results

The following tables and graphs compare three things; the number of participants eligible to become disabled, the number of people expected to become disabled based on the current assumptions, and the number of participants expected to become disabled based on the alternative assumptions. Also, the tables show the calculation of actual-to-expected (A/E) ratios and the r-squared statistic.

The data shows actual disability rates to be close to the expected under the current assumption which was based on prior experience. The alternative assumption makes adjustments to the assumed rates of disability to be more in-line with the confidence intervals and increases the aggregate A/E ratio to be closer to 100%.

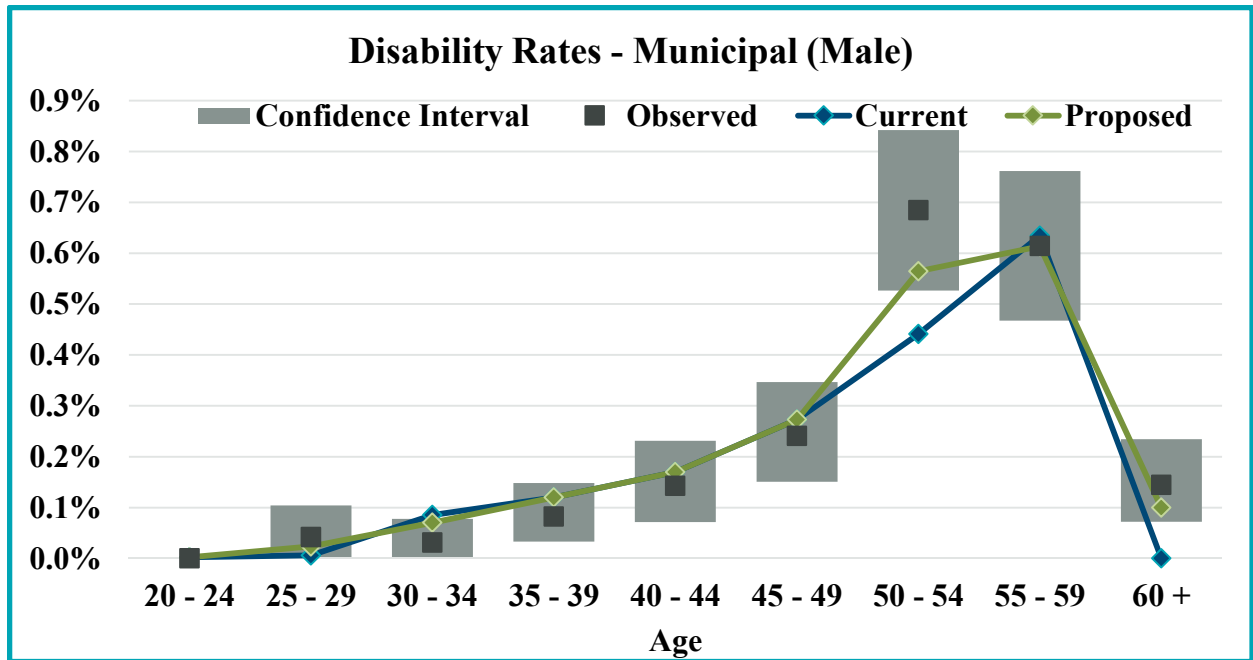
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-D1

Disability Rates - Municipal (Male)									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
20 - 24	1,268	0	0	0	0.00%	0.00%	0.00%	0%	0%
25 - 29	4,806	2	0	1	0.04%	0.01%	0.02%	679%	177%
30 - 34	6,433	2	5	5	0.03%	0.09%	0.07%	37%	44%
35 - 39	6,081	5	7	7	0.08%	0.12%	0.12%	69%	69%
40 - 44	5,621	8	10	10	0.14%	0.17%	0.17%	84%	84%
45 - 49	6,641	16	18	18	0.24%	0.27%	0.27%	88%	88%
50 - 54	7,597	52	34	43	0.68%	0.44%	0.56%	155%	121%
55 - 59	7,486	46	47	46	0.61%	0.63%	0.61%	97%	100%
60 +	5,546	8	0	6	0.14%	0.00%	0.10%	0%	144%
TOTAL	51,479	139	122	135	0.27%	0.24%	0.26%	114%	103%
R-squared			88%	98%					

Chart III-D1



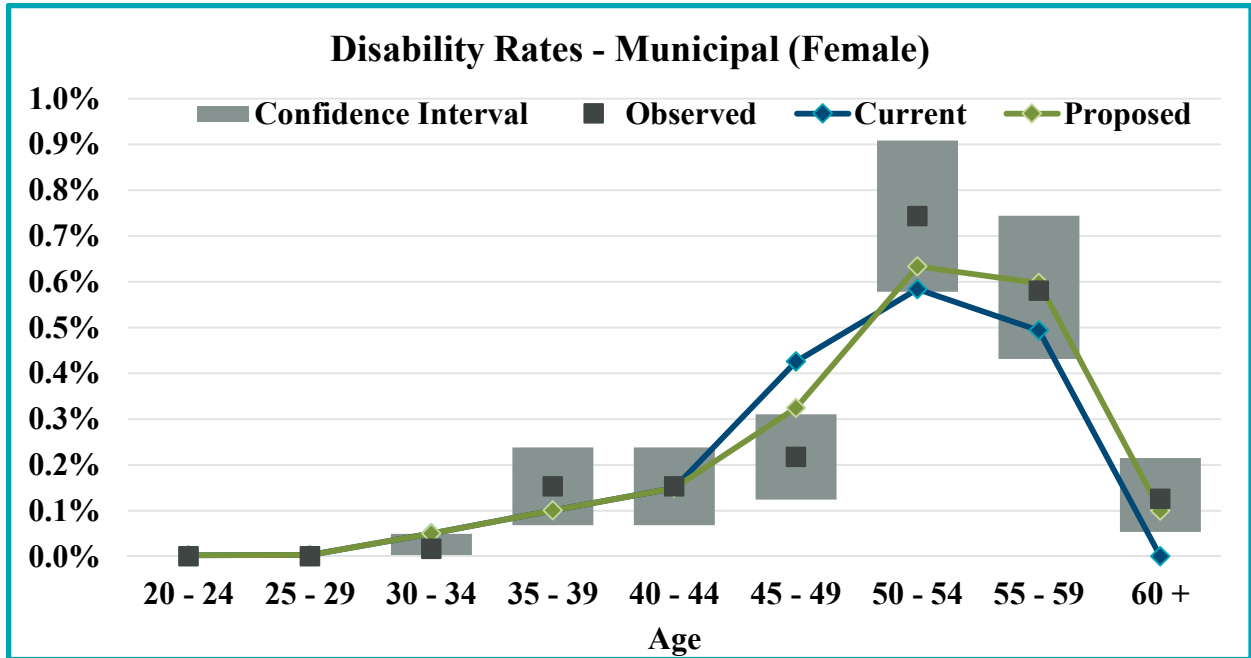
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-D2

Disability Rates - Municipal (Female)									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
20 - 24	1,188	0	0	0	0.00%	0.00%	0.00%	0%	0%
25 - 29	4,681	0	0	0	0.00%	0.00%	0.00%	0%	0%
30 - 34	6,045	1	3	3	0.02%	0.05%	0.05%	33%	33%
35 - 39	5,884	9	6	6	0.15%	0.10%	0.10%	152%	152%
40 - 44	5,881	9	9	9	0.15%	0.15%	0.15%	102%	102%
45 - 49	6,452	14	27	21	0.22%	0.43%	0.32%	51%	67%
50 - 54	7,265	54	42	46	0.74%	0.58%	0.63%	127%	117%
55 - 59	6,723	39	33	40	0.58%	0.49%	0.60%	117%	97%
60 +	5,585	7	0	6	0.13%	0.00%	0.10%	0%	125%
TOTAL	49,704	133	121	131	0.27%	0.24%	0.26%	110%	102%
R-squared			87%	96%					

Table III-D2



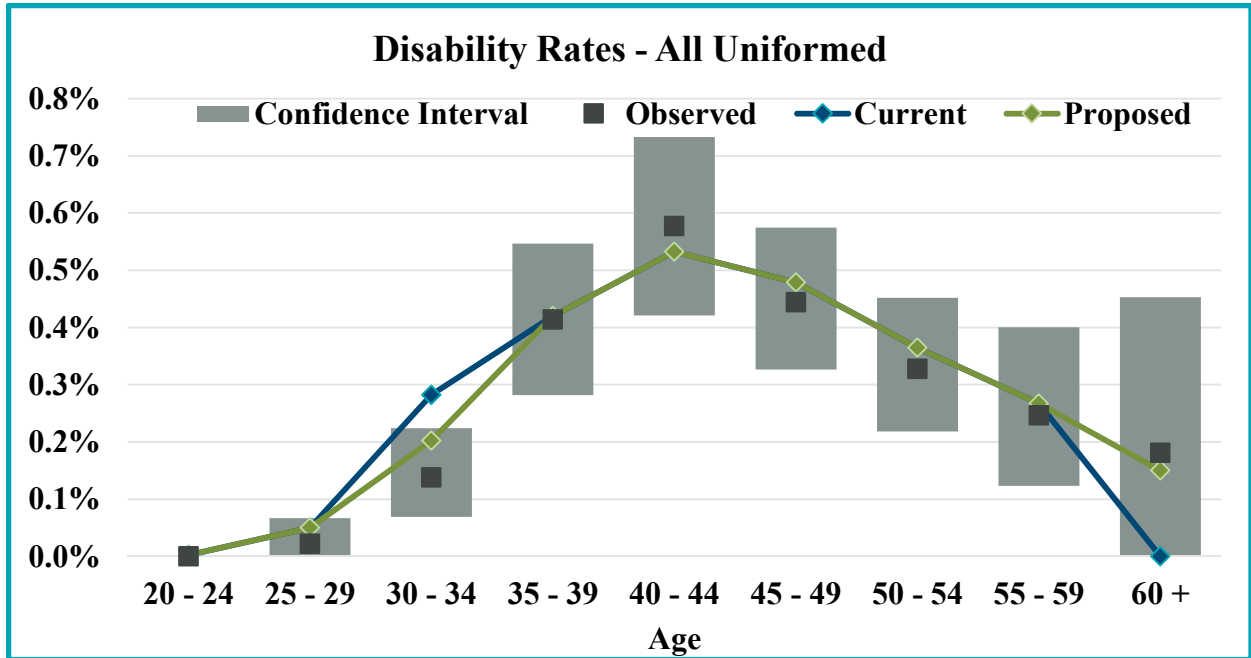
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-D3

Disability Rates - All Uniformed									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
20 - 24	812	0	0	0	0.00%	0.00%	0.00%	0%	0%
25 - 29	4,483	1	2	2	0.02%	0.05%	0.05%	45%	45%
30 - 34	5,803	8	16	12	0.14%	0.28%	0.20%	49%	68%
35 - 39	6,038	25	25	25	0.41%	0.42%	0.42%	99%	99%
40 - 44	6,412	37	34	34	0.58%	0.53%	0.53%	108%	108%
45 - 49	7,659	34	37	37	0.44%	0.48%	0.48%	93%	93%
50 - 54	6,414	21	23	23	0.33%	0.36%	0.36%	90%	90%
55 - 59	3,245	8	9	9	0.25%	0.27%	0.27%	92%	92%
60 +	1,103	2	0	2	0.18%	0.00%	0.15%	0%	121%
TOTAL	41,969	136	147	144	0.32%	0.35%	0.34%	93%	95%
R-squared			95%	98%					

Table III-D3



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

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 System’s experience.

Since the last experience study, the Society of Actuaries (SOA) have released a comprehensive study of U.S. public sector mortality experience including a publication of new mortality tables named the Pub-2010 mortality tables. The Pub-2010 mortality tables are separated between job categories including general employees, public safety, and teachers as well as income level including standard, above, and below median. Because these mortality tables are the latest tables available for public sector plans, we propose moving to these new base tables.

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 and post-disabled 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. Because individuals with higher pension benefit have higher liability, it is more precise for a pension plan to use assumptions that are weighted to reflect the impact on liability. Note this process is not used for active mortality as those members are not in-pay yet.

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 SOA has also continued to update their mortality improvement scale. The fourth step described above develops a mortality projection assumption. For this System, experience studies are performed every four years as required by State law which require regular and detailed review of experience and analysis of the mortality trends such that improvements are addressed incrementally with assumption changes as a result of these studies. This mandatory process allows for periodic recognition of mortality improvements which are sufficient in addressing the potential trend. In recent years, there has been more consideration in using generational mortality which takes into account projected future mortality improvements for the lifetime of

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

each member. In reviewing future mortality improvement, there are debates within the actuarial community over appropriate rates of future improvement and emerging data as well as uncertainty tied to recent experience during the pandemic. In addition, the System’s population has shown higher mortality rates consistent with urban populations when compared to the standard tables. Additionally, there have not been significant mortality liability losses each year for the System.

As a result of the analysis above, for this experience study we support the current methodology of incremental recognition of mortality improvement by using the MP-2021 scale to project mortality improvements through 2025 to cover the period to the next experience study. We will continue to monitor new developments in the use of generational mortality as they arise.

A. Current Assumptions

All Municipal, Police and Fire Employees Active Lives

For all members, the standard RP-2014 (Blue Collar adjustment for Uniformed), projected from base year of 2006 to 2021 using Scale MP-2017 is used. For the Municipal males and females, the table is adjusted by 110% and 115%, respectively. For the Police and Fire males and females, the table is adjusted by 85%.

All Municipal, Police and Fire Retired Healthy Lives

For all members, the standard RP-2014 (Blue Collar adjustment for Uniformed), projected from base year of 2006 to 2021 using Scale MP-2017 is used. For the Municipal males and females, the table is adjusted by 127% and 119%, respectively. For the Police and Fire males and females, the table is adjusted by 115%.

All Municipal, Police and Fire Retired Disabled Lives

For all members, the standard RP-2014, projected from base year of 2006 to 2021 using Scale MP-2017 is used. For the Municipal males and females, the table is adjusted by 95%. For the Police and Fire males and females, the table is adjusted by 80%.

B. Experience

All Municipal, Police and Fire Employees Active Lives

Deaths among active lives are typically small and may not provide meaningful statistics on pre-retirement mortality in a five-year period broken out between males and females. For example, there were 128 actual deaths for active healthy Municipal males compared to 1,878 actual deaths for retired healthy Municipal males. The number of deaths for the other healthy active Municipal females and Uniform males and females were even less. Meanwhile, there is full credibility for the retired healthy population due to the large amount of experience compared to active member healthy population. Additionally, the active and retired healthy members are part of the same populations for a given set of the Pub-2010 tables. Therefore, we have used the same adjustment factors as determined for the retired healthy lives based on the most credible data available.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

All Municipal, Police and Fire Retired Healthy Lives

Mortality for retirees and beneficiaries gives us a larger group to analyze actual versus expected experience. The tables in the next section, split by male and females, show actual and expected experience among members for retirees and beneficiaries combined. The actual mortality among retirees and beneficiaries for Municipal (male and female), Police and Fire members (male) is lower than expected, except for Police and Fire (female) which is higher than expected.

All Municipal, Police and Fire Retired Disabled Lives

Mortality for disabled lives gives us an even smaller group to analyze actual versus expected experience compared to retired healthy lives. However, this is a different group than the healthy lives and therefore uses different mortality tables. Based upon the data, the actual mortality among disabled lives was higher than expected for Municipal (male and female), and lower than expected for Police and Fire (male and female).

C. Alternatives

All Municipal, Police and Fire Employees Active Lives

We use an active adjusted Pub-2010 Employee Below-Median mortality table (General for Municipal and Safety for Uniformed) for the alternative assumptions. For the Municipal males and females, the table is adjusted by 109% and 126%, respectively. For the Police and Fire males and females, the table is adjusted by 118% and 122%, respectively. The adjustments to the base tables are the same amounts as used for the retired healthy lives.

The mortality tables have a mortality projection assumption using MP-2021 projected from base year of 2010 to 2025. This mortality improvement projection builds in the current improvements to the mortality as well as some expected future mortality improvements.

All Municipal, Police and Fire Retired Healthy Lives

We use a retired adjusted Pub-2010 Healthy Annuitant Below-Median mortality table (General for Municipal and Safety for Uniformed) for the alternative assumptions. For the Municipal males and females, the table is adjusted by 109% and 126%, respectively. For the Police and Fire males and females, the table is adjusted by 118% and 122%, respectively.

The mortality tables have a mortality projection assumption using MP-2021 projected from base year of 2010 to 2025. This mortality improvement projection builds in the current improvements to the mortality as well as some expected future mortality improvements.

All Municipal, Police and Fire Retired Disabled Lives

We use a Pub-2010 Disabled Annuitant mortality table (General for Municipal and Safety for Uniformed) for the alternative assumptions. For the Municipal males and females, the table is adjusted by 108% and 105%, respectively. For the Police and Fire males, the table is adjusted by 135%.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

The mortality tables have a mortality projection assumption using MP-2021 projected from base year of 2010 to 2025. This mortality improvement projection builds in the current improvements to the mortality as well as some expected future mortality improvements.

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 non-active 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.

The alternative assumption modifies the assumed rates of mortality based on the adjusted Pub-2010 tables projected to 2025 to be more in-line with the confidence intervals and adjusts the aggregate A/E ratio to be generally closer to 100%.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

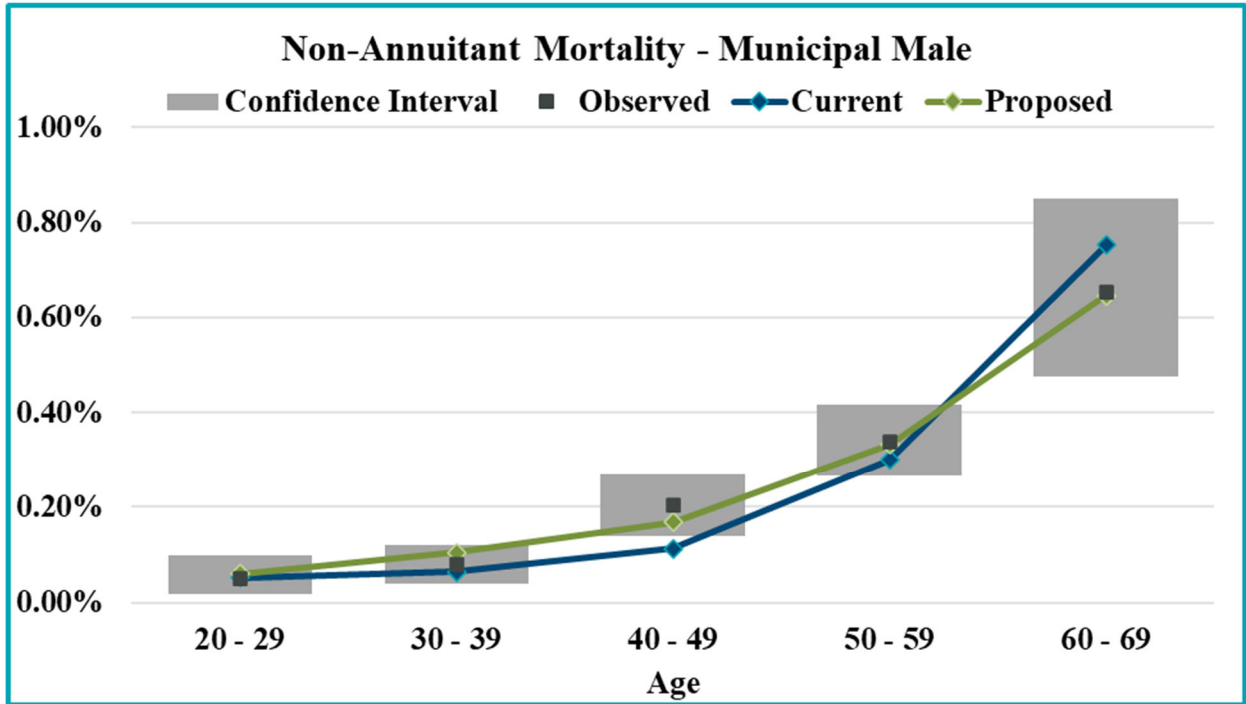
SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Active Mortality Analysis

Table III-M1

Non-Annuitant Municipal Mortality - Base Table for Males						
Age Band	Exposures	Deaths			A/E Ratio	
		Actual	Current	Proposed	Current	Proposed
20 - 29	6,074	3	3	4	95%	82%
30 - 39	12,514	10	8	13	123%	76%
40 - 49	12,262	25	14	21	181%	122%
50 - 59	15,083	51	45	50	113%	102%
60 - 69	5,052	33	38	33	87%	101%
70 +	494	6	8	5	78%	117%
Total	51,479	128	116	125	110%	102%

Chart III-M1



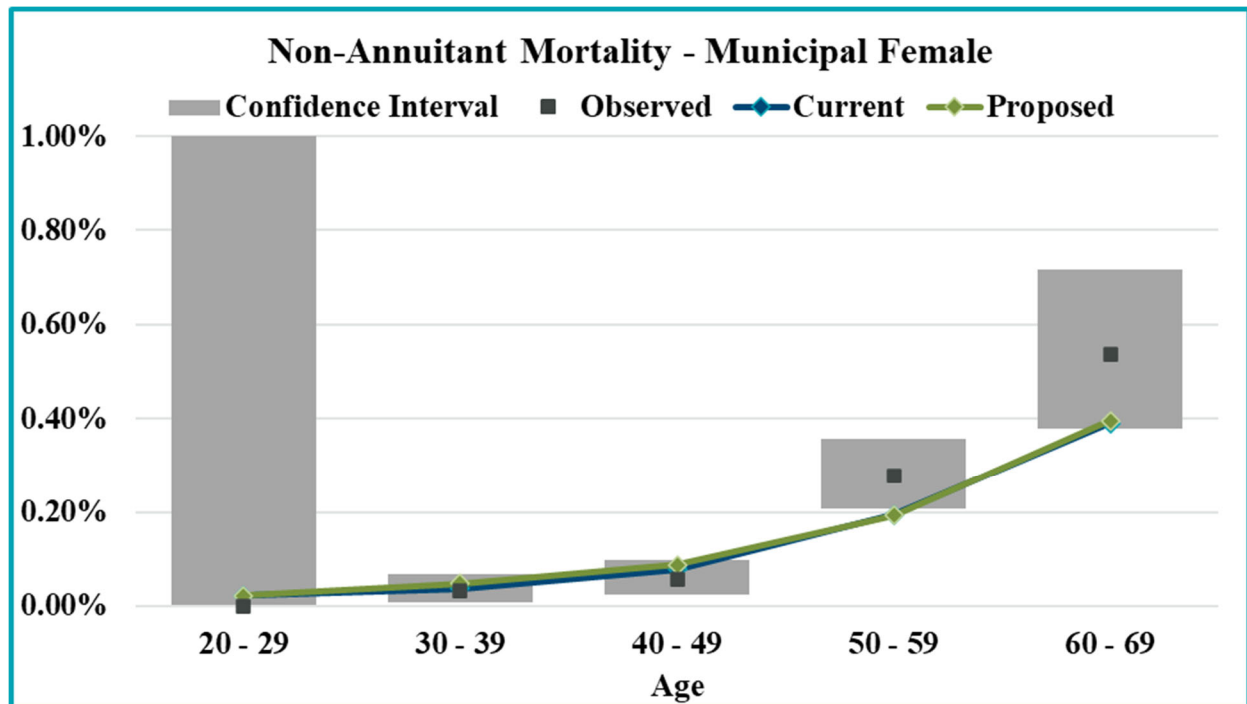
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M2

Non-Annuitant Municipal Mortality - Base Table for Females						
Age Band	Exposures	Deaths			A/E Ratio	
		Actual	Current	Proposed	Current	Proposed
20 - 29	5,869	0	1	1	0%	0%
30 - 39	11,929	4	4	6	91%	69%
40 - 49	12,333	7	10	11	73%	64%
50 - 59	13,988	39	27	27	144%	144%
60 - 69	5,017	27	20	20	138%	136%
70 +	568	7	4	4	170%	176%
Total	49,704	84	66	69	127%	122%

Chart III-M2



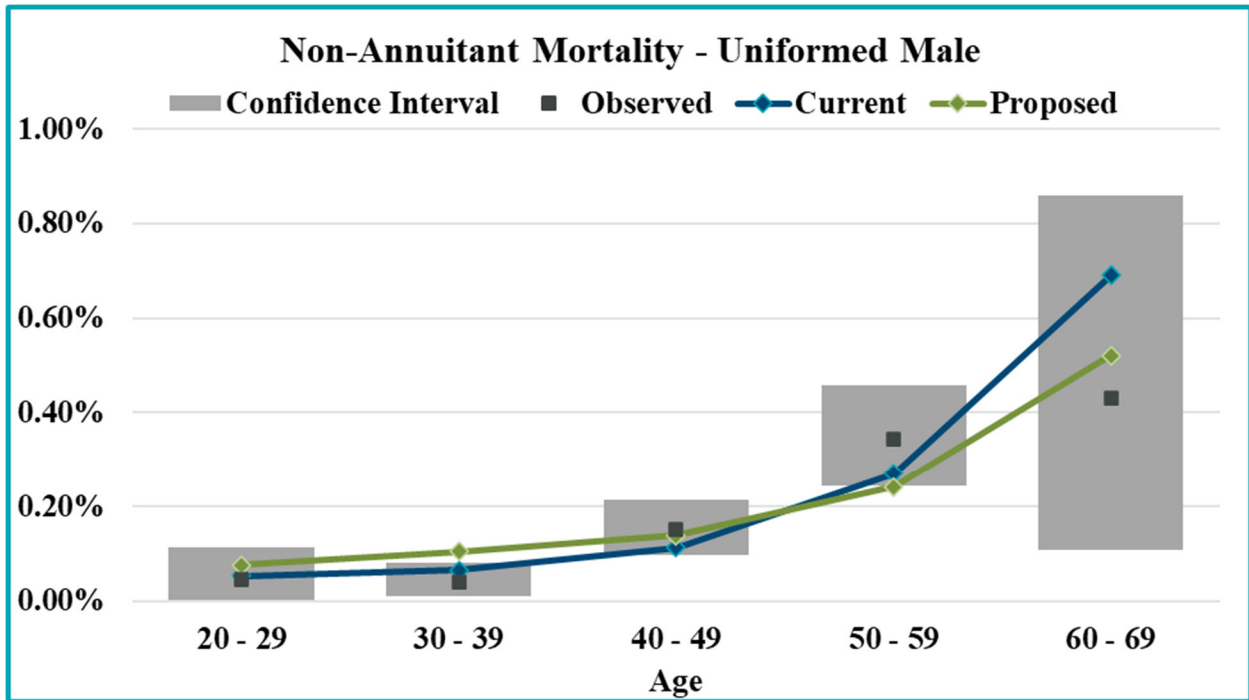
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M3

Non-Annuitant Uniformed Mortality - Base Table for Males						
Age Band	Exposures	Deaths			A/E Ratio	
		Actual	Current	Proposed	Current	Proposed
20 - 29	4,367	2	2	3	87%	60%
30 - 39	10,019	4	7	10	61%	38%
40 - 49	11,223	17	13	16	134%	110%
50 - 59	7,843	27	21	19	128%	143%
60 - 69	930	4	6	5	62%	83%
70 +	12	0	0	0	0%	0%
Total	34,394	54	49	53	110%	101%

Chart III-M3



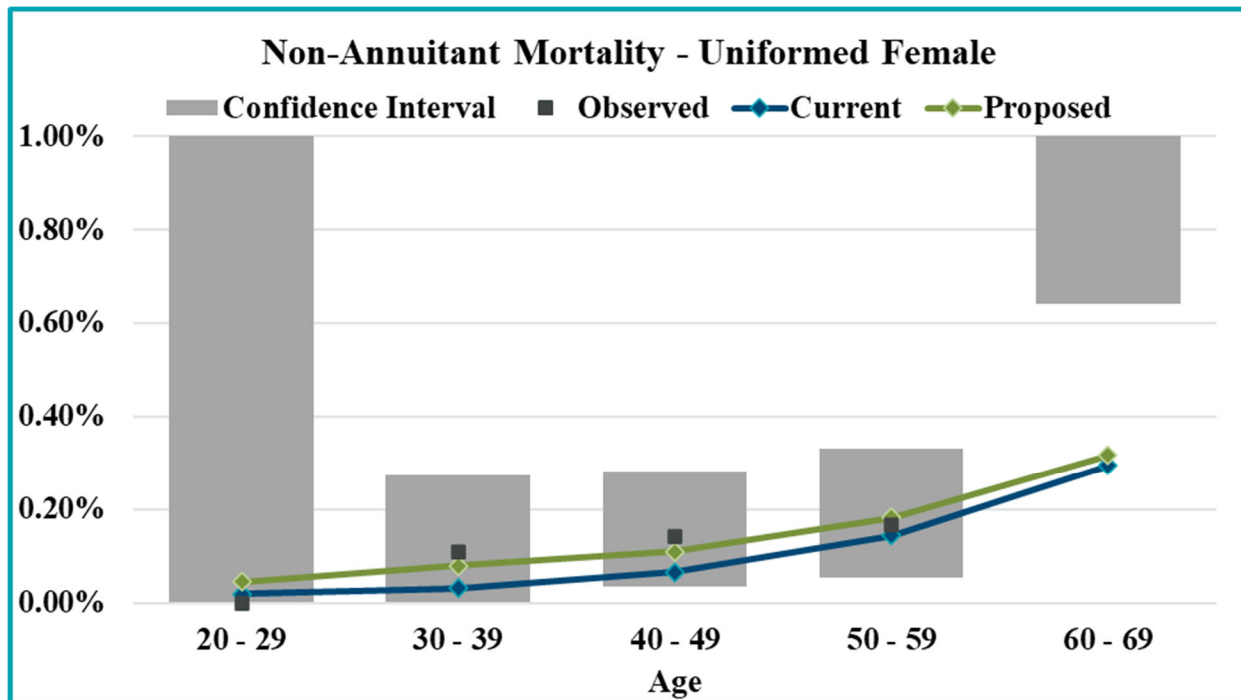
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M4

Non-Annuitant Uniformed Mortality - Base Table for Females						
Age Band	Exposures	Deaths			A/E Ratio	
		Actual	Current	Proposed	Current	Proposed
20 - 29	928	0	0	0	0%	0%
30 - 39	1,822	2	1	1	350%	139%
40 - 49	2,848	4	2	3	213%	129%
50 - 59	1,816	3	3	3	115%	91%
60 - 69	156	3	0	0	654%	607%
70 +	5	0	0	0	0%	0%
Total	7,575	12	6	9	209%	137%

Chart III-M4



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

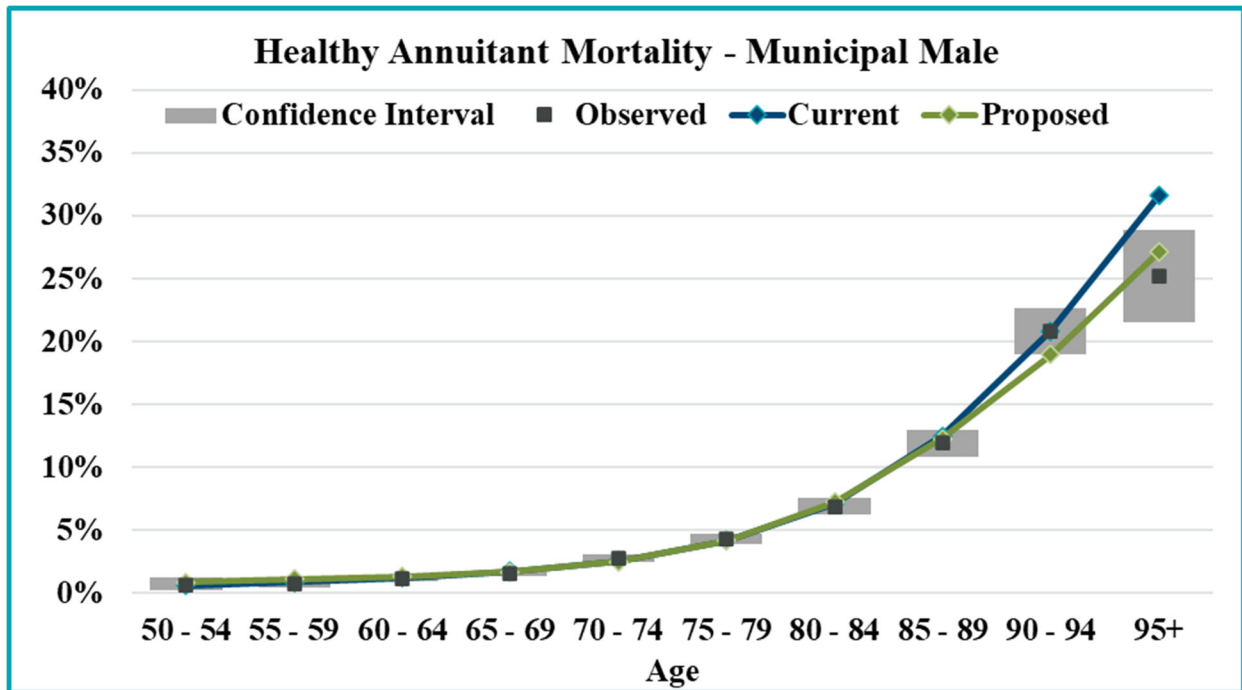
SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Non-Active Mortality Analysis – Retired Participants

Table III-M5

Healthy Annuitant Municipal Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	569	4	5,075,060	30,986	31,098	42,574	100%	73%
55 - 59	2,931	27	96,466,171	663,640	842,099	1,064,291	79%	62%
60 - 64	7,857	114	258,119,272	2,828,396	3,094,077	3,409,751	91%	83%
65 - 69	10,579	181	319,009,904	4,776,988	5,520,425	5,365,724	87%	89%
70 - 74	9,490	270	261,541,744	7,274,481	6,690,370	6,542,338	109%	111%
75 - 79	5,810	265	140,135,732	6,030,116	5,832,383	5,828,165	103%	103%
80 - 84	4,100	307	86,344,529	5,948,364	6,167,575	6,237,321	96%	95%
85 - 89	2,704	331	46,830,600	5,571,888	5,856,795	5,744,130	95%	97%
90 - 94	1,299	276	18,568,515	3,859,294	3,872,560	3,516,474	100%	110%
95 +	377	103	4,299,329	1,085,729	1,357,699	1,165,969	80%	93%
Total	45,716	1,878	1,236,390,856	38,069,882	39,265,079	38,916,737	97%	98%

Chart III-M5



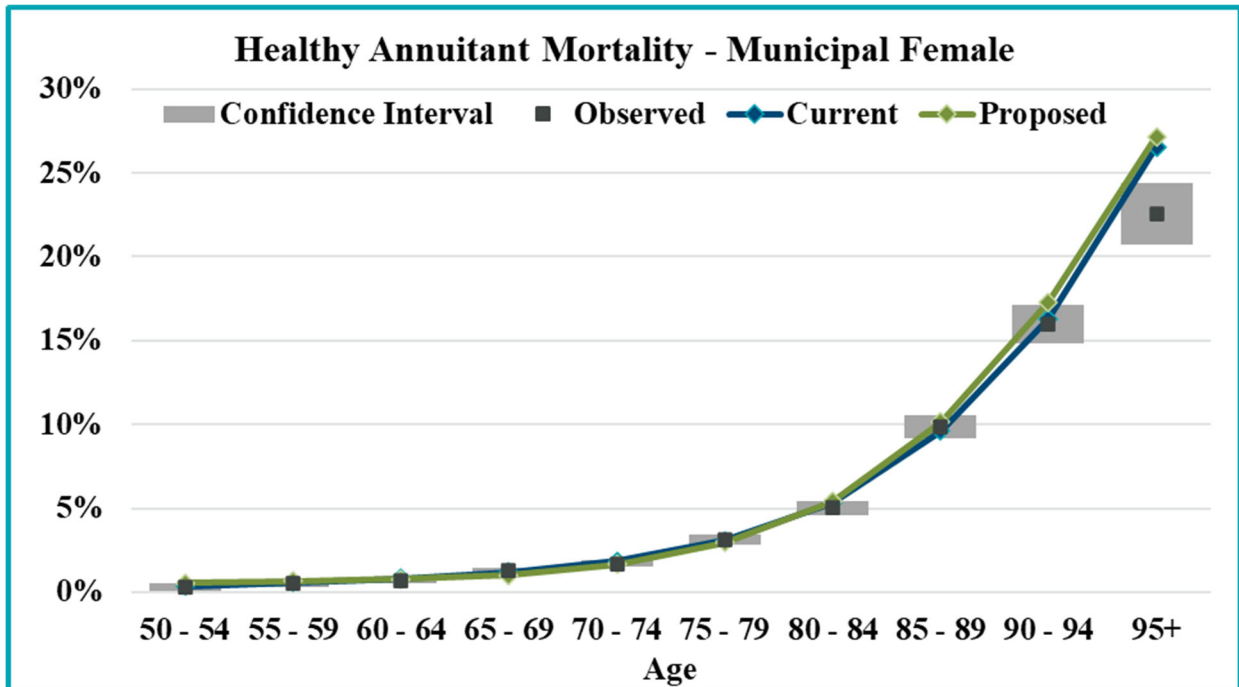
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M6

Healthy Annuitant Municipal Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	731	3	6,627,390	17,294	24,711	35,553	70%	49%
55 - 59	2,959	21	70,563,549	355,053	399,169	461,614	89%	77%
60 - 64	8,063	70	193,544,237	1,367,903	1,570,460	1,465,901	87%	93%
65 - 69	10,863	158	227,273,877	2,950,044	2,701,584	2,281,539	109%	129%
70 - 74	10,246	204	187,423,923	3,204,372	3,441,024	3,075,586	93%	104%
75 - 79	8,226	272	127,480,743	3,987,952	3,912,892	3,776,464	102%	106%
80 - 84	6,713	359	82,571,913	4,138,834	4,403,159	4,469,397	94%	93%
85 - 89	5,129	529	52,022,797	5,115,946	5,008,806	5,284,393	102%	97%
90 - 94	2,885	470	23,192,170	3,698,780	3,784,812	4,012,404	98%	92%
95 +	1,414	335	8,338,704	1,878,511	2,214,858	2,264,785	85%	83%
Total	57,229	2,421	979,039,303	26,714,689	27,461,475	27,127,637	97%	98%

Chart III-M6



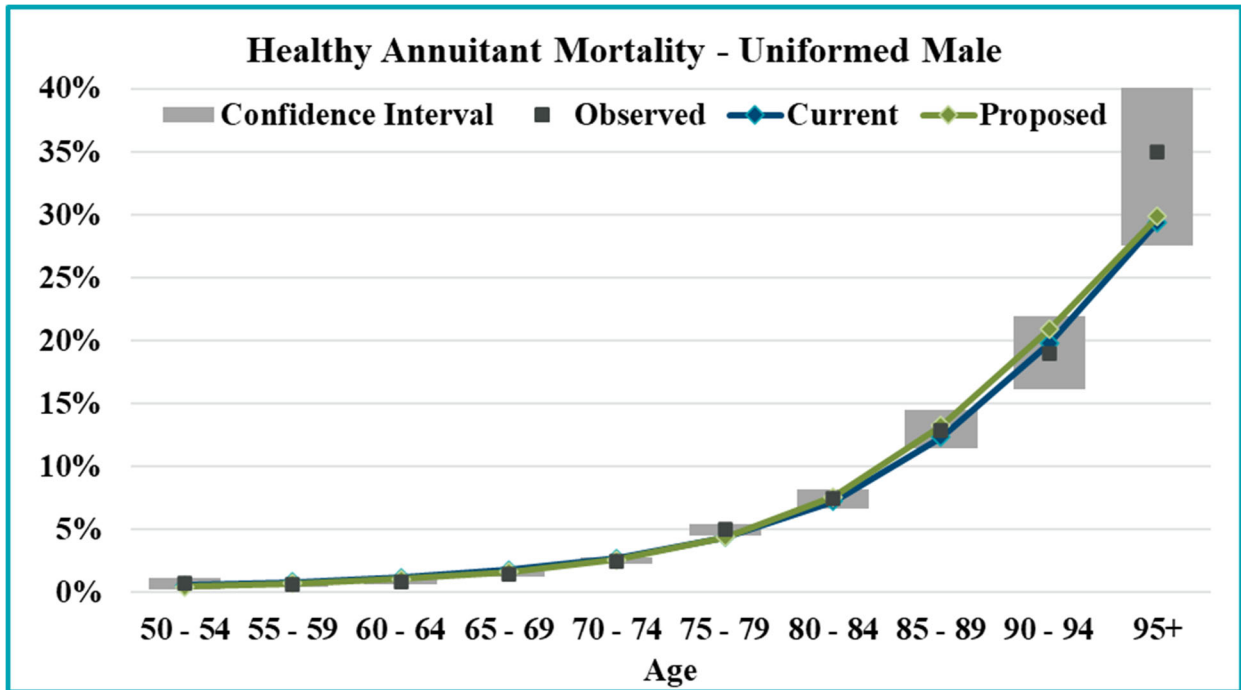
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M7

Healthy Annuitant Uniformed Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	1,036	9	32,716,554	239,687	184,243	151,701	130%	158%
55 - 59	2,935	21	115,043,585	764,233	946,243	822,865	81%	93%
60 - 64	5,212	48	215,709,968	1,779,898	2,607,569	2,359,704	68%	75%
65 - 69	7,711	124	285,537,882	4,180,958	5,200,046	4,703,801	80%	89%
70 - 74	8,462	221	262,121,167	6,624,836	7,199,017	6,822,945	92%	97%
75 - 79	6,094	310	160,258,525	8,016,343	7,036,743	7,050,581	114%	114%
80 - 84	3,127	254	71,173,874	5,301,738	5,171,108	5,429,860	103%	98%
85 - 89	1,375	191	28,255,069	3,655,352	3,497,791	3,746,533	105%	98%
90 - 94	488	99	9,705,443	1,844,125	1,923,624	2,031,914	96%	91%
95 +	98	32	1,726,164	603,887	507,904	516,154	119%	117%
Total	36,538	1,309	1,182,248,231	33,011,057	34,274,288	33,636,058	96%	98%

Chart III-M7



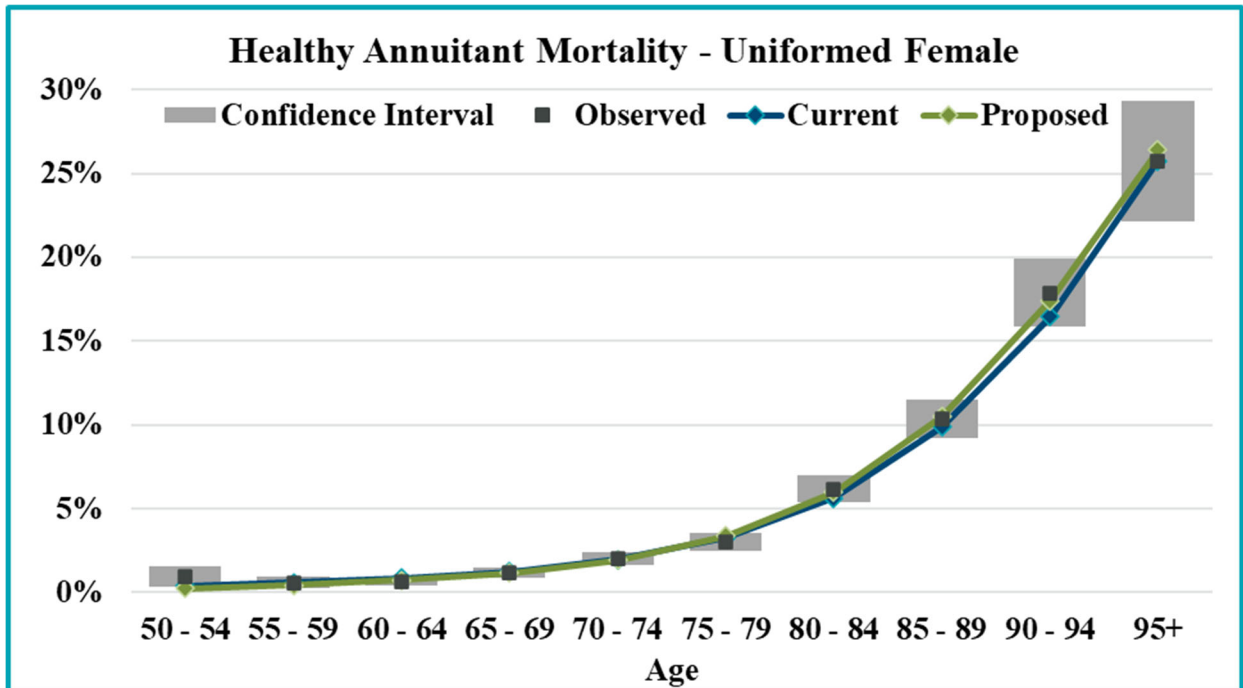
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M8

Healthy Annuitant Uniformed Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	633	4	16,119,921	147,462	63,294	40,530	233%	364%
55 - 59	1,347	9	38,989,317	228,181	225,962	173,699	101%	131%
60 - 64	2,135	15	55,029,763	363,849	467,942	410,665	78%	89%
65 - 69	2,714	34	52,314,021	604,680	646,523	602,639	94%	100%
70 - 74	3,057	63	41,541,534	831,863	808,467	791,375	103%	105%
75 - 79	2,883	86	30,916,463	931,635	1,008,658	1,043,433	92%	89%
80 - 84	2,455	147	21,631,370	1,331,354	1,217,895	1,295,218	109%	103%
85 - 89	1,788	194	13,954,033	1,442,212	1,377,209	1,465,771	105%	98%
90 - 94	1,026	180	7,354,166	1,313,969	1,209,288	1,281,332	109%	103%
95 +	416	112	2,414,579	620,726	621,972	637,882	100%	97%
Total	18,454	844	280,265,167	7,815,931	7,647,210	7,742,546	102%	101%

Chart III-M8



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

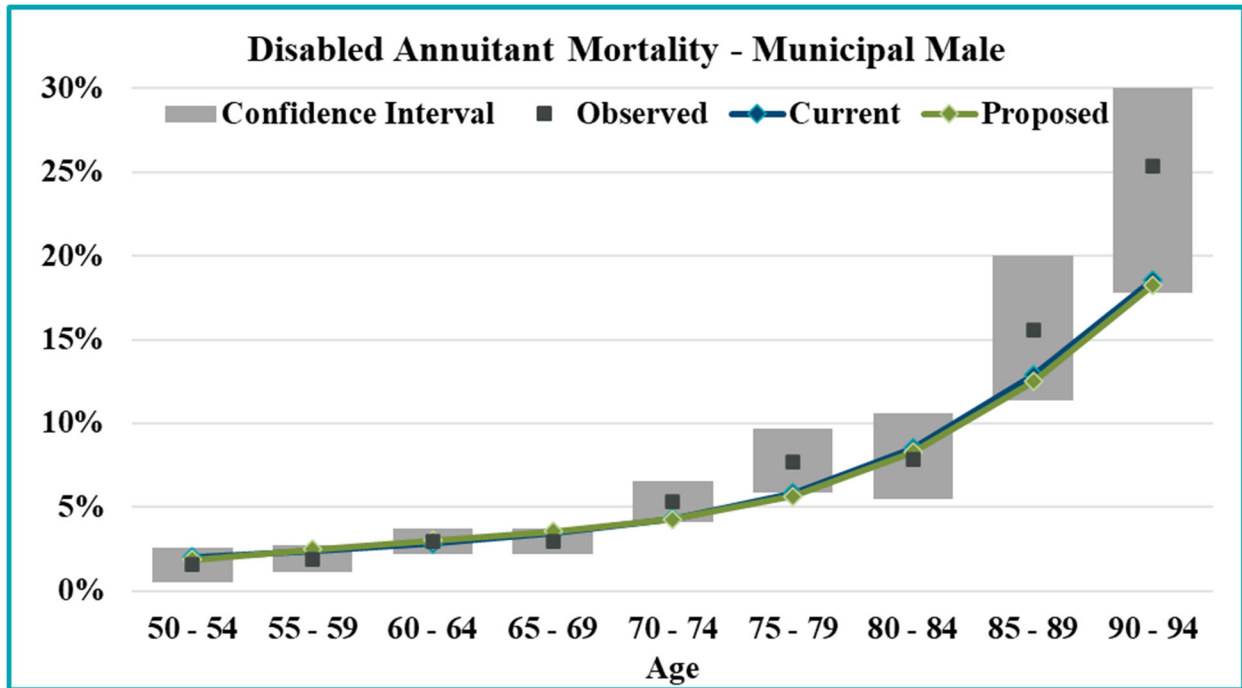
SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Non-Active Mortality Analysis – Disabled Participants

Table III-M9

Disabled Annuitant Municipal Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	383	6	9,029,707	143,254	182,311	169,052	79%	85%
55 - 59	802	19	18,278,473	341,236	432,521	455,667	79%	75%
60 - 64	1,233	44	27,198,942	794,348	765,863	816,534	104%	97%
65 - 69	1,156	37	23,712,168	693,510	814,252	839,559	85%	83%
70 - 74	902	52	17,336,404	924,122	749,466	737,950	123%	125%
75 - 79	546	45	10,021,052	774,485	586,655	567,273	132%	137%
80 - 84	312	28	5,192,341	408,741	441,803	430,957	93%	95%
85 - 89	185	27	2,275,728	354,412	293,528	284,297	121%	125%
90 - 94	73	21	755,335	191,702	140,428	137,993	137%	139%
95 +	7	1	30,988	6,494	8,432	8,836	77%	73%
Total	5,599	280	113,831,138	4,632,304	4,415,261	4,448,118	105%	104%

Chart III-M9



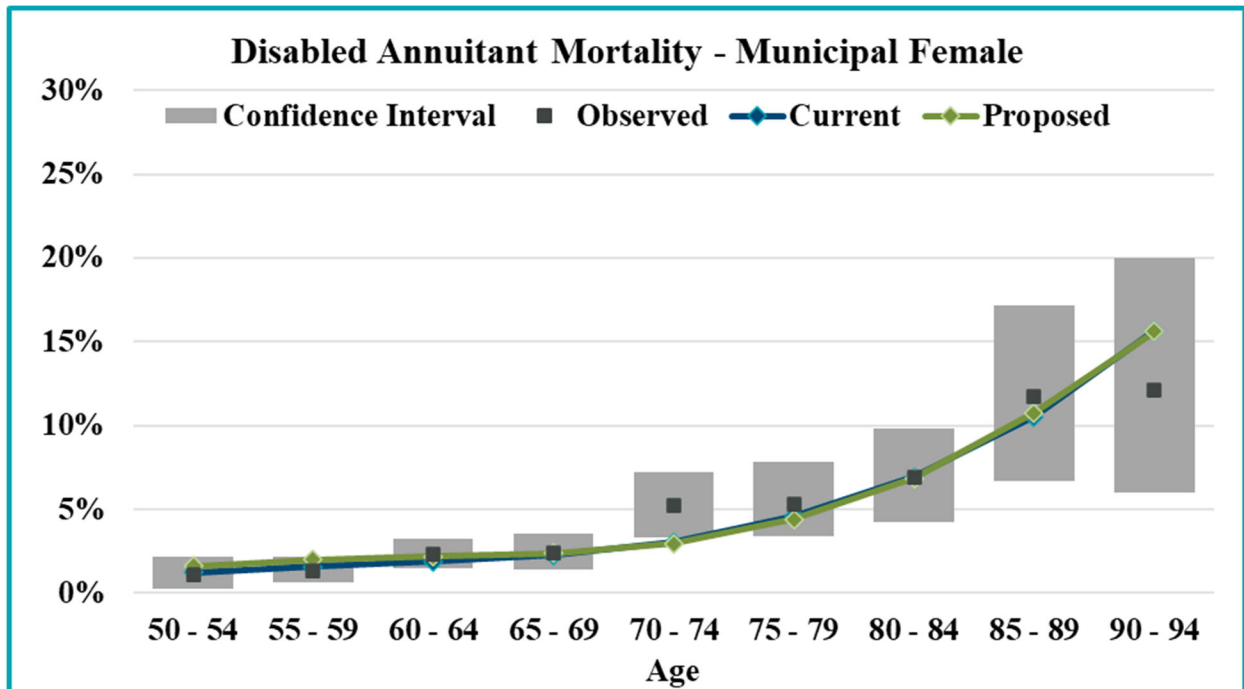
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M10

Disabled Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	368	4	6,822,785	76,754	84,581	109,854	91%	70%
55 - 59	655	9	12,074,377	164,172	191,590	240,771	86%	68%
60 - 64	742	14	14,436,757	334,039	272,192	316,761	123%	105%
65 - 69	565	14	10,201,328	248,733	230,607	241,775	108%	103%
70 - 74	331	18	5,736,982	299,816	173,905	169,959	172%	176%
75 - 79	268	13	3,746,291	200,211	171,841	165,853	117%	121%
80 - 84	214	15	2,280,043	158,095	158,413	156,749	100%	101%
85 - 89	105	17	817,975	96,282	86,170	87,999	112%	109%
90 - 94	50	8	420,930	50,915	65,827	65,781	77%	77%
95 +	24	8	140,202	41,178	30,372	30,356	136%	136%
Total	3,322	120	56,677,670	1,670,195	1,465,499	1,585,857	114%	105%

Chart III-M10



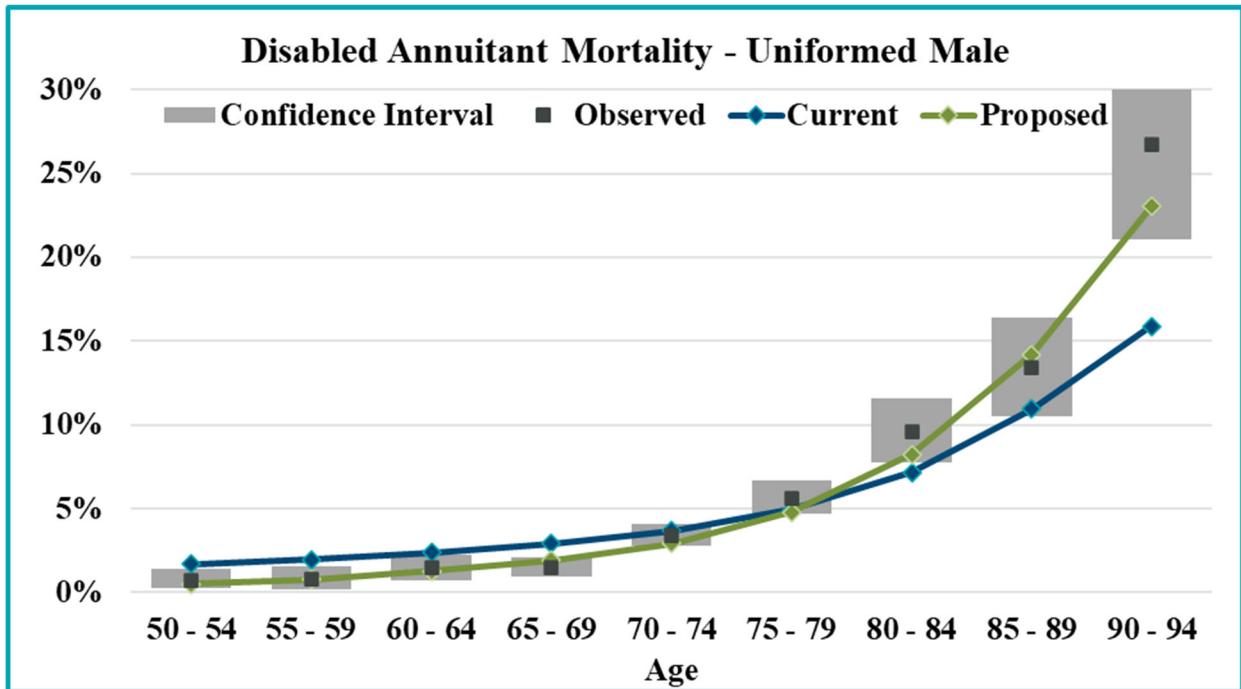
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M11

Disabled Annuitant Uniformed Mortality - Base Table for Males									
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios		
				Actual	Current	Proposed	Current	Proposed	
50 - 54	438	3	17,449,680	125,126	294,740	88,348	42%	142%	
55 - 59	516	5	18,100,928	148,593	356,346	138,583	42%	107%	
60 - 64	710	10	19,418,942	284,886	463,138	245,501	62%	116%	
65 - 69	1,312	19	28,136,303	412,503	819,669	541,412	50%	76%	
70 - 74	1,852	68	35,372,132	1,208,499	1,301,891	1,028,080	93%	118%	
75 - 79	1,501	83	25,387,429	1,432,223	1,250,342	1,219,566	115%	117%	
80 - 84	656	65	10,154,596	976,625	727,687	835,757	134%	117%	
85 - 89	391	52	5,366,082	718,117	586,603	762,452	122%	94%	
90 - 94	166	45	2,128,962	568,823	338,097	490,634	168%	116%	
95 +	18	9	261,666	125,690	57,282	88,668	219%	142%	
Total	7,560	359	161,776,720	6,001,085	6,195,795	5,439,001	97%	110%	

Chart III-M11



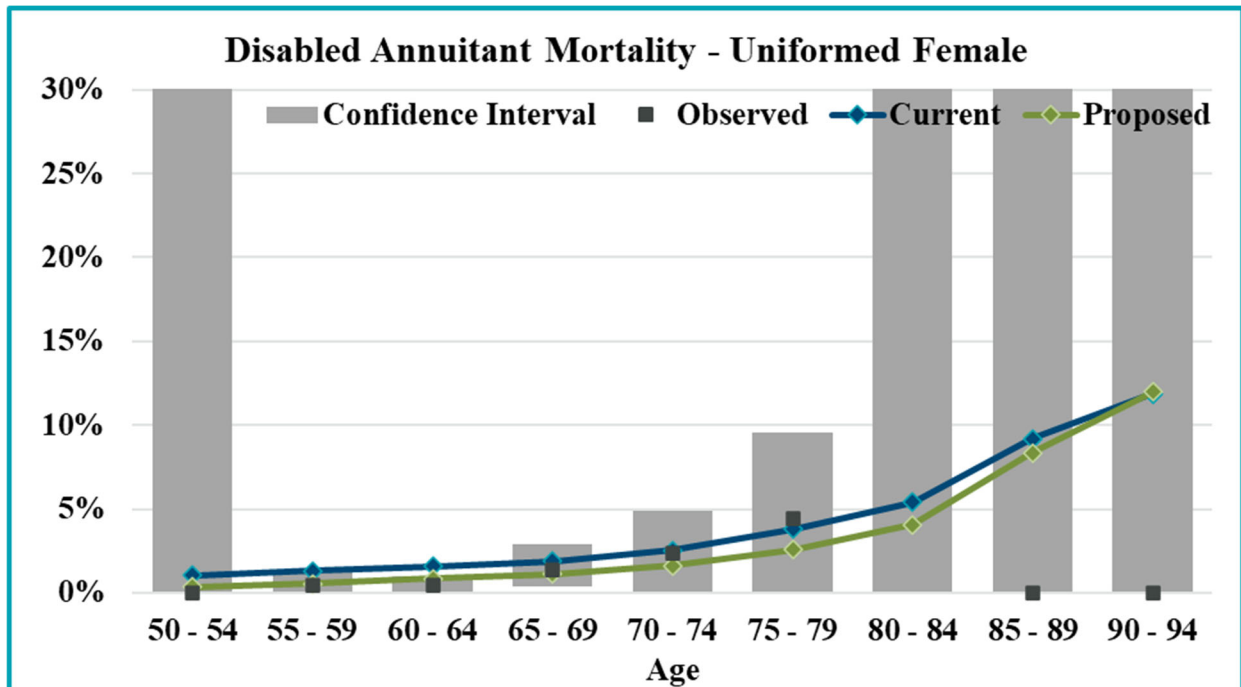
**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III-M12

Disabled Annuitant Uniformed Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Proposed	Current	Proposed
50 - 54	273	0	10,187,376	0	104,567	35,054	0%	0%
55 - 59	307	2	10,244,312	47,526	135,419	57,497	35%	83%
60 - 64	297	1	8,730,574	36,998	139,103	73,863	27%	50%
65 - 69	244	5	6,158,320	83,440	116,401	70,005	72%	119%
70 - 74	122	3	2,666,516	62,960	67,094	43,170	94%	146%
75 - 79	42	2	856,039	37,933	32,362	21,934	117%	173%
80 - 84	4	1	101,832	32,750	5,520	4,136	593%	792%
85 - 89	7	0	84,000	0	7,735	7,002	0%	0%
90 - 94	2	0	24,000	0	2,851	2,871	0%	0%
95 +	0	0	0	0	0	0	0%	0%
Total	1,298	14	39,052,969	301,607	611,052	315,532	49%	96%

Chart III-M12



**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

5. Family Composition

A. Current Assumptions

All Municipal and Police and Fire Employees

70% of active members and 50% of non-active members (elected 50% J&S option 4) are assumed to be married. This non-active assumption was analyzed based upon data provided by the City as well as an improved understanding that many unmarried retirees elect this payment option.

Male spouses are assumed to be four-years older than female spouses.

B. Experience

All Municipal, Police and Fire Employees

61% of deceased actives had spouses upon their death. This percentage increases to 69% if the 2021 year is excluded which was likely skewed lower due to the pandemic as spouses have yet to receive payment.

34% of the deceased retirees that elected the 50% Joint and Survivor option 4 had spouses upon their death.

Male spouses are approximately three and a half years older than female spouses based on deceased retirees that had spouses.

C. Alternative

All Municipal, Police and Fire Employees

40% of non-active members are assumed married. There are no suggested changes for active members assumed married or spouse age difference.

6. Disability: Ordinary vs Service Connected

A. Current Assumptions

All Municipal and Police and Fire Employees

For Municipal members, we assume 65% of all disabilities are ordinary and 35% are service-connected. For Police and Fire members, we assume 25% are ordinary and 75% are service-connected.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

SECTION III – ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

B. Experience

All Municipal, Police and Fire Employees

Based on disability exposures from 2016-2021 for Municipal members, 69% of all disabilities were ordinary and 31% were service-connected. For Police and Fire members, 16% were ordinary and 84% were service-connected. The experience appears to be in-line with the current assumptions.

C. Alternative

All Municipal, Police and Fire Employees

There are no suggested changes.

7. Death: Ordinary vs Service Connected

A. Current Assumptions

All Municipal and Police and Fire Employees

For Municipal members, we assume 98.5% of all deaths are ordinary and 1.5% is service-connected. For Police and Fire members, we assume 92% are ordinary and 8% are service-connected.

B. Experience

All Municipal, Police and Fire Employees

Based on death exposures from 2016-2021 for Municipal members, 98.2% of all disabilities were ordinary and 1.8% were service-connected. For Police and Fire members, 96% were ordinary and 4% were service-connected. The experience appears to be in-line with the current assumptions.

C. Alternative

All Municipal, Police and Fire Employees

There are no suggested changes.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

Data Assumptions and Practices

In preparing our data, we relied on information supplied by the City of Philadelphia Municipal Retirement System staff. The data was reviewed to ensure that it complies with generally accepted actuarial standards. This information includes, but is not limited to, plan provisions, employee data, and financial information. Our methodology for obtaining the data used for the valuation is based upon the following assumptions and practices:

- We exclude raw active records with dates of hire after the valuation date.
- We include terminated vested records in the valuation data, regardless of whether they have enough service for vesting.
- We exclude terminated vested and retired records with values of zero in the benefit field.
- If a participant is found in multiple data files (e.g., both the active and retired data files), based on a match of both employee number and Social Security Number, we first attempt to identify the record with the most recent status change, and keep only that record. If it is not apparent which record is the most recent, we keep the record that generates the highest liability in our valuation system.
- If a participant is found multiple times in the same data file, based on a match of both employee number and Social Security Number, we keep the record that generates the highest liability in our valuation system.
- The date of retirement for a terminated vested participant was set to the valuation date, if the given date was earlier.
- If the payment form field for pensioners is missing, we assume that 1967 Plan members receive a 50% J&S annuity with a return of contributions in excess of payments received upon death of the member, and we assume that Plan 87 members receive a life annuity, also with a return of contributions. However, if the pensioner is a beneficiary or survivor, we assume that they receive a life annuity only.
- Records with missing dates of birth have their data filled in based on the average for their plan.
- We assumed that all changes in participant data from last year to this year were valid unless indicated otherwise by System staff.
- DROP participants are assumed to begin payments immediately
- For Municipal Plan 1967 participants pay was assumed to be below the Social Security Taxable Wage Base for purposes of determining the aggregate member contribution amount.
- We assumed that any participant who was active last year, missing this year is now a terminated non-vested participant.
- We assumed that any participant who was inactive last year and missing from this year without a clear reason is now deceased.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

Actuarial Assumptions

1. Investment Return Assumption

7.45% compounded annually, net of expenses.

2. Salary Increase Rate

Age	Municipal and Elected Officials	Uniformed
<20	20.00%	20.00%
20	18.00%	11.00%
25	10.00%	7.00%
30	7.00%	5.00%
35	5.75%	4.25%
40	5.00%	4.00%
45	4.60%	3.50%
50	4.35%	3.30%
55	4.10%	3.00%
60	3.85%	3.00%
65+	3.50%	2.75%

3. Total Annual Payroll Growth

3.30% per year.

4. Administrative Expenses

Annual expected expenses included in this report are \$10,029,224 and assumed to increase by 3.30% per year. This amount is included in the normal cost as an explicit assumption for purposes of determining contribution amounts.

5. Funding of the Pension Adjustment Fund

To recognize the expense of the benefits payable under the Pension Adjustment Fund, the actuarial liabilities have been increased by 0.54%. This estimate is based on the statistical average expected value of the benefits.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

6. Rates of Termination

Termination rates are based on Division and age, sample rates shown below.

Age	Municipal and Elected Officials	Uniformed
20	0.2200	0.0350
25	0.1500	0.0310
30	0.1000	0.0235
35	0.0775	0.0160
40	0.0650	0.0100
45	0.0525	0.0100
50	0.0450	0.0100
55	0.0450	0.0000
60	0.0900	0.0000

We assume that a vested employee who terminates will elect a pension deferred to service retirement age as long as their age plus years of service at termination are greater than or equal to 55 (45 for police and fire employees in the 1967 Plan). Otherwise, we assume they elect a refund of member contributions.

7. Rates of Disability

Disability rates are based on Division and age and split between gender for Municipal and Elected Officials, sample rates shown below.

Age	Municipal and Elected Officials		Uniformed
	Male	Female	Unisex
20	0.000025	0.000025	0.000025
25	0.000050	0.000025	0.000500
30	0.000750	0.000400	0.001800
35	0.001000	0.000800	0.004000
40	0.001500	0.001300	0.005000
45	0.001900	0.002800	0.005200
50	0.004000	0.005700	0.004000
55	0.005400	0.005500	0.003000
60	0.000000	0.000000	0.000000

*For municipal and elected members, we assume that 65% of all disabilities are ordinary and 35% are service-connected. For police and fire members, we assume that 25% are ordinary and 75% are service-connected.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

8. Rates of Pre-Retirement Mortality

Municipal and Elected Officials: 110% and 115%, for males and females, respectively, of the RP-2014 Employee Table projected from base year of 2006 to 2021 using mortality improvement scale MP-2017.

Uniformed: 85% of the RP-2014 Blue Collar Employee Table projected from base year of 2006 to 2021 using mortality improvement scale MP-2017.

Experience studies are performed every four years as required by State law which require regular and detailed experience and analysis of the mortality trends such that improvements are addressed incrementally with assumption changes as a result of these studies. This mandatory process allows for periodic recognition of mortality improvements which are sufficient in addressing the potential trend. The most recent experience study was conducted for the period between July 1, 2012 and June 30, 2017.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
20	0.000409	0.000189	0.000408	0.000157
25	0.000530	0.000212	0.000530	0.000176
30	0.000550	0.000268	0.000550	0.000221
35	0.000668	0.000380	0.000668	0.000315
40	0.000772	0.000524	0.000772	0.000434
45	0.001086	0.000769	0.001086	0.000638
50	0.001802	0.001226	0.001802	0.001016
55	0.003018	0.002002	0.003018	0.001660
60	0.005319	0.003088	0.005319	0.002560
65	0.009579	0.004453	0.009578	0.003691

* For municipal and elected members, we assume that 98.5% of all deaths are ordinary, with 1.5% service-connected. For police and fire members, 92% are assumed to be ordinary and 8% service-connected.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

9. Rates of Post-Retirement Mortality

Municipal and Elected Officials: 127% and 119% for males and females, respectively, of the RP-2014 Healthy Annuitant Table projected from base year 2006 to 2021 using mortality improvement scale MP-2017.

Uniformed: 115% of the RP-2014 Blue Collar Healthy Annuitant Table projected from base year of 2006 to 2021 using mortality improvement scale MP-2017.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
50	0.005015	0.003186	0.004541	0.003139
55	0.007168	0.004486	0.006789	0.004817
60	0.010180	0.006792	0.010031	0.007252
65	0.014715	0.010033	0.015263	0.010512
70	0.021742	0.015288	0.023114	0.016035
75	0.034319	0.024900	0.036499	0.026399
80	0.057729	0.042731	0.060617	0.045229
85	0.101295	0.076712	0.102771	0.079656
90	0.178648	0.137255	0.174268	0.138509
95	0.278849	0.224212	0.261914	0.219761

10. Rates of Post-Disability Mortality

Municipal and Elected Officials: 95% of the RP-2014 Disabled Retiree Table projected from base year 2006 to 2021 using mortality improvement scale MP-2017.

Uniformed: 80% of the RP-2014 Disabled Retiree Table projected from base year 2006 to 2021 using mortality improvement scale MP-2017.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
35	0.010106	0.004319	0.008510	0.003637
40	0.011676	0.005959	0.009832	0.005018
45	0.016427	0.008752	0.013834	0.007370
50	0.018826	0.010942	0.015854	0.009214
55	0.021849	0.014315	0.018399	0.012055
60	0.026070	0.017756	0.021954	0.014953
65	0.031668	0.020761	0.026668	0.017483
70	0.039130	0.026749	0.032952	0.022526
75	0.051951	0.038967	0.043748	0.032814
80	0.073980	0.059755	0.062299	0.050320

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

11. Rates of Retirement

Rates of Service Retirement - 1967 Plan		
Age	Municipal	Uniformed
45	0.00	0.10
46-52	0.00	0.05
53-54	0.00	0.10
55	0.30	0.15
56	0.20	0.17
57	0.30	0.20
58	0.30	0.20
59	0.20	0.20
60	0.20	0.25
61	0.20	0.30
62	0.25	0.30
63	0.20	0.30
64	0.20	0.30
65	0.30	0.30
66	0.20	0.30
67	0.20	0.30
68	0.20	0.30
69	0.30	0.30
70+	1.00	1.00

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS

Rates of Service Retirement - 1987 Plan and Plan '10				
Age	Municipal and Elected Officials		Uniformed	
	First Year Eligible	Subsequent Years	First Year Eligible	Subsequent Years
45	0.000	0.000	0.030	0.000
46-49	0.000	0.000	0.030	0.030
50	0.000	0.000	0.060	0.060
51	0.000	0.000	0.100	0.050
52	0.050	0.020	0.100	0.050
53-54	0.100	0.020	0.100	0.050
55	0.100	0.020	0.100	0.070
56	0.100	0.020	0.100	0.100
57	0.100	0.020	0.100	0.070
58	0.100	0.020	0.100	0.120
59	0.100	0.080	0.100	0.120
60	0.250	0.250	0.100	0.120
61	0.150	0.200	0.100	0.120
62	0.400	0.250	0.100	0.300
63	0.250	0.200	0.100	0.300
64	0.300	0.200	0.100	0.300
65-69	0.600	0.200	0.100	0.500
70	0.100	1.000	0.100	1.000

Retirements under DROP are included in the rates above.

12. Family Composition Assumptions

70% of active members and 50% of non-active members are assumed to be married for retirees with the 50% J&S with return on contribution form of payment only. Male spouses are assumed to be four-years older than female spouses.

13. Service-connected disability benefit

Service-connected disability benefits are increased by 2.9% to account for the periodic adjustment.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

1. Investment Return Assumption

7.45% compounded annually, net of expenses.

2. Salary Increase Rate

Salary increases are based on Division and age, sample rates shown below.

Age	Municipal and Elected Officials	Uniformed
<20	20.00%	18.00%
20	18.00%	16.50%
25	10.00%	10.00%
30	7.00%	6.25%
35	5.75%	4.50%
40	4.50%	4.00%
45	4.25%	3.75%
50	4.00%	3.50%
55	3.75%	3.25%
60	3.50%	3.00%
65+	3.25%	2.75%

3. Total Annual Payroll Growth

3.30% per year.

4. Administrative Expenses

Annual expected expenses included in this report are \$10,029,224 and assumed to increase by 3.30% per year. This amount is included in the normal cost as an explicit assumption for purposes of determining contribution amounts.

5. Funding of the Pension Adjustment Fund

To recognize the expense of the benefits payable under the Pension Adjustment Fund, the actuarial liabilities have been increased by 0.54%. This estimate is based on the statistical average expected value of the benefits.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

6. Rates of Termination

Termination rates are based on Division and age, sample rates shown below.

Age	Municipal and Elected Officials	Uniformed
20	0.2500	0.0400
25	0.1500	0.0360
30	0.1000	0.0260
35	0.0775	0.0160
40	0.0650	0.0200
45	0.0400	0.0200
50	0.0400	0.0200
55	0.0600	0.0000
60	0.1000	0.0000

We assume that a vested employee who terminates will elect a pension deferred to service retirement age as long as their age plus years of service at termination are greater than or equal to 55 (45 for police and fire employees in the 1967 Plan). Otherwise, we assume they elect a refund of member contributions.

7. Rates of Disability

Disability rates are based on Division and age and split between gender for Municipal and Elected Officials, sample rates shown below.

Age	Municipal and Elected Officials		Uniformed
	Male	Female	Unisex
20	0.000025	0.000025	0.000025
25	0.000062	0.000025	0.000500
30	0.000500	0.000400	0.001000
35	0.001000	0.000800	0.004000
40	0.001500	0.001300	0.005000
45	0.001900	0.002200	0.005200
50	0.004200	0.004900	0.004000
55	0.006700	0.007100	0.003000
60	0.001000	0.001000	0.001500

* For municipal and elected members, we assume that 65% of all disabilities are ordinary and 35% are service-connected. For police and fire members, we assume that 25% are ordinary and 75% are service-connected.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

8. Rates of Pre-Retirement Mortality

Municipal and Elected Officials: 109% and 126%, for males and females, respectively, of the Pub-2010(B) General Employee Below-Median Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Uniformed: 118% and 122%, for males and females, respectively, of the Pub-2010(B) Safety Employee Below-Median Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Experience studies are performed every four years as required by State law which require regular and detailed experience and analysis of the mortality trends such that improvements are addressed incrementally with assumption changes as a result of these studies. This mandatory process allows for periodic recognition of mortality improvements which are sufficient in addressing the potential trend. The most recent experience study was conducted for the period between July 1, 2016 and June 30, 2021.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
20	0.000459	0.000178	0.000546	0.000238
25	0.000526	0.000185	0.000694	0.000389
30	0.000800	0.000333	0.000916	0.000612
35	0.001143	0.000538	0.001128	0.000851
40	0.001455	0.000717	0.001280	0.000975
45	0.001727	0.000886	0.001425	0.001072
50	0.002246	0.001212	0.001774	0.001349
55	0.003276	0.001904	0.002582	0.001961
60	0.005101	0.003038	0.004159	0.002805
65	0.007369	0.004495	0.006375	0.003528

* For municipal and elected members, we assume that 98.5% of all deaths are ordinary, with 1.5% service-connected. For police and fire members, 92% are assumed to be ordinary and 8% service-connected.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

9. Rates of Post-Retirement Mortality

Municipal and Elected Officials: 109% and 126%, for males and females, respectively, of the Pub-2010(B) General Healthy Annuitant Below-Median Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Uniformed: 118% and 122%, for males and females, respectively, of the Pub-2010(B) Safety Healthy Annuitant Below-Median Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
50	0.007429	0.004756	0.003826	0.001754
55	0.009223	0.005700	0.005497	0.003241
60	0.011855	0.006803	0.008769	0.005895
65	0.014133	0.008222	0.013323	0.009439
70	0.020760	0.012908	0.021031	0.014947
75	0.033034	0.022428	0.034785	0.025666
80	0.056316	0.041032	0.060553	0.046061
85	0.098783	0.077590	0.106886	0.082580
90	0.163564	0.144523	0.182201	0.145491
95	0.239137	0.228763	0.265109	0.224738

10. Rates of Post-Disability Mortality

Municipal and Elected Officials: 108% and 105%, for males and females, respectively, of the Pub-2010 General Disabled Annuitant Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Uniformed: 135% for males only of the Pub-2010 Safety Disabled Annuitant Table projected from base year of 2010 to 2025 using mortality improvement scale MP-2021.

Age	Municipal and Elected Officials		Uniformed	
	Male	Female	Male	Female
40	0.009685	0.007998	0.003266	0.001986
45	0.012050	0.010102	0.003620	0.002178
50	0.016386	0.013994	0.004505	0.002732
55	0.021442	0.017605	0.006086	0.004437
60	0.027148	0.020804	0.009965	0.007081
65	0.032589	0.022241	0.015872	0.009962
70	0.038468	0.025891	0.023506	0.013871
75	0.048862	0.036004	0.038126	0.020926
80	0.069412	0.056150	0.066101	0.035271

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

11. Rates of Retirement

Retirement rates are based on Division, age, and Plan. For the 1987, 2010, and 2016 Plans, rates are also split based on service eligibility for reduced and unreduced early retirement benefits.

Rates of Service Retirement - 1967 Plan		
Age	Municipal	Uniformed
45	0.00	0.10
46-52	0.00	0.05
53-54	0.00	0.10
55	0.30	0.15
56	0.20	0.17
57-58	0.30	0.20
59	0.20	0.20
60	0.20	0.25
61	0.20	0.30
62	0.25	0.30
63-64	0.20	0.30
65	0.30	0.30
66-68	0.20	0.30
69	0.30	0.30
70+	1.00	1.00

Rates of Service Retirement - 1987 Plan, 2010 Plan, and 2016 Plan				
Age	Municipal and Elected Officials		Uniformed	
	< 33 Years	33+ Years	< 25 Years	25+ Years
45-49	0.00	0.00	0.005	0.03
50	0.00	0.00	0.06	0.06
51	0.00	0.00	0.05	0.05
52-54	0.01	0.03	0.05	0.05
55	0.02	0.03	0.07	0.07
56-57	0.02	0.03	0.10	0.10
58-59	0.02	0.03	0.12	0.12
60	0.27	0.27	0.12	0.12
61	0.20	0.20	0.12	0.12
62	0.27	0.27	0.30	0.30
63	0.20	0.20	0.30	0.30
64-69	0.25	0.25	0.30	0.30
70+	1.00	1.00	0.10	0.10

Retirements under DROP are included in the rates above.

**CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2016 – JUNE 30, 2021**

APPENDIX B – ALTERNATIVE ACTUARIAL ASSUMPTIONS

12. Family Composition Assumptions

70% of active members and 40% of non-active members are assumed to be married for retirees with the 50% J&S with return on contribution form of payment only. Male spouses are assumed to be four-years older than female spouses.

13. Service-connected disability benefit

Service-connected disability benefits are increased by 2.9% to account for the periodic adjustment.