Laborers' and Retirement Board Employees'
Annuity and Benefit Fund of Chicago

Special Meeting – Regular Minutes

March 7, 2018
9:00 AM
Office of the Fund

Date of Meeting: March 7, 2018

Start Time: 9:12 a.m.

Location: The Fund Office, 321 N. Clark Street, Suite 1300, Chicago, IL 60654

The following were Present:

Victor Roa	- President
Erin Keane	- Vice President
Michael LoVerde	- Secretary
Carol Hamburger	- Trustee *(arrived at 9:14 am)*
James Capasso, Jr.	- Trustee
Carole Brown	- Trustee *(arrived at 9:14 am)*
James Joiner	- Trustee
Graham Grady	- Taft Stettinius & Hollister LLP, Fund's Attorney
James Wesner	- Marquette Associates, Fund's Investment Consultant
Kweku Obed	- Marquette Associates, Fund's Investment Consultant
Neil Capps	- Marquette Associates, Fund's Investment Consultant
Michael Walsh	- Executive Director and Chief Investment Officer
Peggy Grabowski	- Comptroller
John Carroll	- Compliance Administrator
Sheila Jones	- Administrative Coordinator
Nadia Oumata	- Manager of Accounting and Investments
Christopher Lucas	- Staff Actuary/Senior Developer

Absent: Kurt Summers - Trustee

A special meeting of the Retirement Board ("Board") of the Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago was held at the Fund office on March 7, 2018. President Roa declared there was a quorum after Secretary LoVerde took attendance. There was no public participation.

EXECUTIVE SESSION NO. 1

At 9:14 a.m., Trustee LoVerde requested an executive session under 5 ILCS 120/2(c)(7) to discuss the sale or purchase of securities, investments or investment contracts. Trustee Joiner seconded the motion.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

At 9:16 a.m., Trustee LoVerde made a motion, seconded by Trustee Hamburger, that the executive session be adjourned and that the Board return to open session.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

EXECUTIVE SESSION NO. 2

At 9:16 a.m., Trustee LoVerde requested an executive session under 5 ILCS 120/2(c)(7) to discuss the sale or purchase of securities, investments or investment contracts. Trustee Hamburger seconded the motion.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

At 10:40 a.m., Trustee Hamburger made a motion, seconded by Trustee LoVerde, that the executive session be adjourned and that the Board return to open session.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

The Trustees gave direction to begin contract negotiations for the discussed investment.

EXECUTIVE SESSION NO. 3

At 10:50 a.m., Trustee LoVerde requested an executive session under 5 ILCS 120/2(c)(7) to discuss the sale or purchase of securities, investments or investment contracts. Trustee Joiner seconded the motion.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

At 12:59 p.m., Trustee Summers made a motion, seconded by Trustee LoVerde, that the executive session be adjourned and that the Board return to open session.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against -- None.

The Trustees gave direction to begin contract negotiations for the discussed investment.

Gabriel Roeder Smith & Company (GRS) Experience Study

Alex Rivera and Ryan Gunderson of Gabriel Roeder Smith & Company ("GRS") presented the 2017 Actuarial Experience Study which they prepared for the period from January 1, 2012 through December 31, 2016. See attached document. GRS reminded the Trustees of the purpose of the Experience Study and reviewed a PowerPoint presentation outlining the demographic and economic assumptions that they recommend be implemented by the LABF. See attached GRS Experience Review presentation. The Trustees followed-up with questions on the recommendations. The Trustees discussed and requested additional information regarding the recommended investment return assumption, and specifically asked that the asset allocation mapping used in the investment return recommendation be reviewed by staff and the Fund's investment consultant. The Trustees decided to continue the discussion of GRS Experience Review at the March 20, 2018 Board meeting when they have the additional information they had requested.

House Bill 4413

The Trustees discussed House Bill 4413 and expressed concerns related to some of the administrative hurdles the Fund would need to overcome if the bill became law. The Board directed the Executive Director to inform the Fund's legislative liaison that the Fund opposes the legislation as written.

ADJOURNMENT

With no further business, at 2:35 p.m., Trustee LoVerde made a motion to adjourn. Trustee Joiner seconded the motion.

Roll-call: For-- Trustees Roa, Keane, LoVerde, Hamburger, Capasso, Brown and Joiner.
Against – None.

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago

2017 Actuarial Experience Study

January 1, 2012, to December 31, 2016

GRS Retirement Consulting

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March 2, 2018

Board of Trustees
Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago
321 North Clark Street, Suite 1300
Chicago, Illinois 60654

Subject: 2017 Actuarial Experience Study

Dear Members of the Board:

We are pleased to present our report on the results of the 2017 Actuarial Experience Study for the Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago ("LABF" or "Fund"). The purpose of the study is to determine the continued appropriateness of the actuarial assumptions used in the annual actuarial valuation by comparing actual experience to expected experience. Our study was based on census information for the period from January 1, 2012, to December 31, 2016, as provided by LABF staff. This report includes our recommendations for new actuarial assumptions to be effective for the December 31, 2017, actuarial valuation. It also describes the actuarial impact produced by these recommendations as though they had been effective for the December 31, 2016, actuarial valuation.

Our study includes a review of the experience associated with the following actuarial assumptions:

- Price inflation;
- Investment Return;
- General wage inflation and payroll growth;
- Salary increases;
- Mortality;
- Retirement;
- Withdrawal (Turnover); and
- Disability.

With the Board's approval of the recommendations in this report, we believe the actuarial condition of LABF will be more accurately portrayed. The Board's decisions should be based on the appropriateness of each recommendation individually, not on their collective effect on the funding period or the unfunded liability.

The results of the experience study and recommended assumptions set forth in this report are based on the data and actuarial techniques and methods described above, and upon the provisions of LABF as of the most recent valuation date, December 31, 2016. To the best of our knowledge the information contained in this report is accurate and fairly presents the experience of members participating in LABF for the period January 1, 2012, to December 31, 2016.

The signing actuaries are independent of the plan sponsor.

This report should not be relied on for any purpose other than the purpose stated.

This study was conducted in accordance with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Alex Rivera and Lance J. Weiss are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. Finally, each of the undersigned are experienced in performing actuarial valuations for large public retirement systems. We thank the LABF staff for their assistance in providing data for this study.

We believe that the proposed actuarial assumptions that are the result of this experience study represent a reasonable estimate of expected future experience of the Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago.

Respectfully submitted,

Gabriel, Roeder, Smith & Company

Alex Rivera, F.S.A., E.A., M.A.A.A., F.C.A.
Senior Consultant

Lance J. Weiss, E.A., M.A.A.A., F.C.A.
Senior Consultant

Table of Contents

Section	Items	Page
	Transmittal Letter	
A	**Executive Summary**	**1-2**
B	**Introduction**	**1-5**
C	**Analysis of Experience and Recommendations**	**1-36**
D	**Cost Impact**	**1-2**
E	**Recommended Actuarial Assumptions**	**1-5**

SECTION A

EXECUTIVE SUMMARY

Executive Summary

The results of the five-year experience review of the Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago are presented in this report. The review was conducted for the purposes of updating the actuarial assumptions used in:

- Valuing the actuarial liabilities effective as of December 31, 2017, and
- Projecting the minimum required statutory City contribution for payment year 2023. City contributions for payment years 2018 through 2022 are fixed by statute.

The last comparable experience review was prepared for the period January 1, 2004, to December 31, 2011. In this report, we review the current actuarial assumptions and methods and compare them to the actual experience of the Fund for the years 2012 through 2016.

The table below lists each of the primary assumptions and methods that we analyzed, including our recommendations for each item, and the overall financial impact of the recommended changes.

Actuarial Assumption	Recommendation	Financial Impact
Price Inflation	Lower Rate	Decrease
Investment Return	Lower Rate	Increase
Wage Inflation/Payroll Growth	Lower Rate	Decrease
Salary Increases Due to Merit/Seniority	Lower Rates	Decrease
Pre and Post-Retirement Mortality Rates	Lower Rates	Increase
Retirement Rates	Lower Rates	Decrease
Turnover Rates	Lower Rates	Increase
Disability Load	Increase	Increase
Dependent Assumptions	Lower	Decrease
Overall	**Various**	**Increase**

Executive Summary

The impact of adopting the recommended assumptions is summarized in the table below. The results are based on the December 31, 2016, valuation and include the funding policy and benefit changes provided under PA 100-0023.

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago							
Valuation Date	December 31, 2016						
Scenario	Baseline Valuation	Recommended Assumptions (7.00 Percent Discount Rate)			Sensitivity Assumptions (7.25 Percent Discount Rate)		
Investment Return Assumption/Discount Rate	7.50 Percent	7.00 Percent	7.00 Percent	7.00 Percent	7.25 Percent	7.25 Percent	7.25 Percent
			% Difference	Amount Difference		% Difference	Amount Difference
City Contribution Requirement for Payment Year 2023 under PA 100-0023:							
· Annual Amount	$ 123,100,077	$ 135,851,374	10.36%	$ 12,751,298	$ 131,985,164	7.22%	$ 8,885,087
· Percentage of Projected Payroll	42.16%	47.14%		4.98%	46.36%		4.20%
Actuarially Determined Contribution (ADC) for fiscal year 2017:							
· Annual Amount	$ 124,226,042	$ 141,358,108	13.79%	$ 17,132,066	$ 130,729,803	5.24%	$ 6,503,761
· Percentage of Covered Payroll	59.68%	67.91%		8.23%	62.80%		3.12%
Actuarial Information							
· Total Normal Cost Amount	$ 38,910,344	$ 41,499,600	6.65%	$ 2,589,256	$ 39,554,848	1.66%	$ 644,504
· Actuarial Accrued Liability (AAL)							
Active and Inactive Members	$ 914,051,369	$ 911,999,258	(0.22)%	$ (2,052,111)	$ 877,252,309	(4.03)%	$ (36,799,060)
Annuitants	1,595,221,142	1,711,271,552	7.27%	116,050,410	1,674,340,001	4.96%	79,118,859
Total	$ 2,509,272,511	$ 2,623,270,810	4.54%	$ 113,998,299	$ 2,551,592,310	1.69%	$ 42,319,799
· Unfunded Actuarial Accrued Liability	$ 1,245,607,640	$ 1,359,605,939	9.15%	$ 113,998,299	$ 1,287,927,439	3.40%	$ 42,319,799
· Funded Ratio based on AVA	50.36%	48.17%		(2.19)%	49.52%		(0.84)%
· UAAL as % of Covered Payroll	598.40%	653.17%		54.77%	618.74%		20.33%
· Funded Ratio based on MVA	46.54%	44.51%		(2.02)%	45.77%		(0.77)%

The overall impact of the recommended changes would be an increase in the actuarial liability of approximately 4.5 percent and a decrease in the funded ratio of 2.2 percentage points. The projected City contribution to the Fund in payment year 2023 (first year City contribution is calculated as opposed to a pre-determined amount) under the funding policy established by Public Act 100-0023 (PA 100-0023) would increase from 42.2 percent to 47.1 percent as a percentage of projected capped payroll and $123.1 million to $135.9 million as a dollar amount.

New assumptions will first be used in the December 31, 2017, actuarial valuation, at which time experience gains or losses incurred during 2017 will also be recognized.

SECTION B

INTRODUCTION

Introduction

Background

For any pension plan, actuarial assumptions are selected that are intended to provide reasonable estimates of future expected events, such as Fund investment returns, interest crediting and patterns of retirement, turnover and mortality. These assumptions, along with an actuarial cost method, an asset valuation method, the employee census data and the plan's provisions are used to determine the actuarial liabilities and overall actuarially determined funding requirements for the plan. The true cost to the plan over time will be the actual benefit payments and expenses required by the plan's provisions for the participant group under the plan. To the extent the actual experience deviates from the actuarial assumptions, experience gains and losses will occur. These gains (losses) then serve to reduce (increase) future actuarially determined contributions and increase (reduce) the funded ratio.

A periodic review and selection of the actuarial assumptions is one of many important components of understanding and managing the financial aspects of the Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago. Use of outdated or inappropriate assumptions can result in understated costs which will lead to higher future contribution requirements or perhaps an inability to pay benefits when due; or, on the other hand, produce overstated costs which place an unnecessarily large burden on the current generation of members, employers, and taxpayers.

A single set of assumptions is typically not expected to be suitable forever. As the actual experience unfolds or the future expectations change, the assumptions should be reviewed and adjusted accordingly.

It is important to recognize that the impact from various outcomes and the ability to adjust from experience deviating from the assumption are not symmetric. Due to compounding economic forces, legal limitations and moral obligations, outcomes from underestimating future liabilities are much more difficult to manage than outcomes of overestimates. That asymmetric risk should be considered when the assumption set, investment policy and funding policy are created. As such, the assumption set used in the actuarial valuation process needs to represent the best estimate of the future experience of the System and be at least as likely, if not more than likely, to overestimate the future liabilities versus underestimate them.

Using this strategic mindset, each assumption was analyzed compared to the actual experience of LABF and general experience of other large public employee retirement funds. Changes in certain assumptions and methods are suggested based on this comparison to remove any bias that may exist and to perhaps add in a slight margin for future adverse experience where appropriate. Next, the assumption set as a whole was analyzed for consistency and to ensure that the projection of liabilities was reasonable and consistent with historical trends.

The Actuarial Standards Board ("ASB") provides guidance on measuring the costs of financing a retirement program through the following Actuarial Standards of Practices ("ASOP"):

- ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*;
- ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*;
- ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*; and
- ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*.

Introduction

The recommendations provided in this report are consistent with the preceding actuarial standards of practice.

The ASB recently adopted the Actuarial Standard of Practice No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions. ASOP No. 51 will be effective for any actuarial work product with a measurement date on or after November 1, 2018.

Summary of Process

In determining liabilities and contribution rates for retirement plans, actuaries must make assumptions about the future. The actuarial assumptions are usually divided into two categories:

- Economic assumptions, which include:
  - Assumed rate of price inflation (as measured by the change in the Consumer Price Index for all Urban consumers)
    - Underlies all other economic assumptions
    - Basis for cost-of-living increases and increases in the pay cap for pensionable pay for members hired after January 1, 2011
  - Assumed long-term rate of return on investments
    - Rate at which projected benefits are reduced to present value
  - General wage increases and payroll growth assumption
    - Reflects inflationary forces on increases in pay for all members
    - Reflects expectation of growth in payroll and affects level percent of pay contribution requirements
  - Salary Increases
- Demographic assumptions, which include:
  - Mortality rates
  - Retirement rates
  - Withdrawal (Turnover) rates
  - Disability rates

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For others, such as the investment return assumption, the link between past and future results may be weaker. In either case, actuaries should review the plan's assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

The last such actuarial experience study was performed following the December 31, 2011, actuarial valuation and the recommendations were adopted on February 9, 2013, and became effective for the December 31, 2012, actuarial valuation. For this experience study, we have reviewed LABF's experience for the five-year period from January 1, 2012, through December 31, 2016.

In conducting experience studies, actuaries generally use data over a period of several years. This is necessary in order to gather enough data so that the results are statistically significant. In addition, if the study period is too short, the impact of the current economic conditions may lead to misleading results. It is known, for example, that the health of the general economy can affect salary increase rates and

withdrawal rates. Using results gathered during a short-term boom or bust period will not be representative of the long-term trends in these assumptions. Also, the adoption of legislation, such as plan improvements or changes in salary schedules, will sometimes cause a short-term distortion in the experience. For example, if an early retirement window was opened during the study period, we would usually see a short-term spike in the number of retirements followed by a decrease of retirements for the following two-to-four years. Using a longer period prevents giving too much weight to such short-term effects. On the other hand, using a much longer period could dampen real changes that may be occurring, such as mortality improvement or a change in the ages at which members retire.

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected to occur, based on the current actuarial assumptions. The number of "expected" decrements is determined by multiplying the probability of the occurrence at the given age, by the "exposures" at that same age. For example, consider a rate of retirement of 15 percent at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus they are considered "exposed" to that assumption. Finally, we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect," the A/E ratio would be 100 percent. When it varies significantly from this figure, it is a sign that new assumptions may be needed. However, in some cases we prefer to set our assumptions to produce an A/E ratio a little above or below 100 percent, in order to introduce some conservatism. Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by gender, by age and by service.

If the data leads the actuary to conclude that new tables are needed, the actuary may "graduate" or smooth the results, since the raw results can be quite uneven from age to age or from service to service.

Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumptions sets that could be supported, and would show higher or lower liabilities or costs.

Summary of Recommendations

Our recommended changes to the current actuarial assumptions may be summarized as follows:

Economic Assumptions

- **Price inflation**: We recommend decreasing the rate of price inflation from 3.00 percent to 2.25 percent.

- **Retiree Cost-of-Living Adjustment and Increases in the Pay Cap for Pensionable Pay for Participants Hired on and After January 1, 2011**: We recommend reducing the assumed rate of COLA and increases in capped pay for participants hired on or after January 1, 2011, from 1.50 percent to 1.125 percent (from 50 percent of 3.00 percent to 50 percent of 2.25 percent).

- **Investment return**: We recommend decreasing the nominal investment return assumption from 7.50 percent to 7.00 percent. Based on the results of the asset allocation study performed in September 2017, by LABF's investment consultants (Marquette Associates), the adopted portfolio produced a median annual return of 7.80 percent over the next 10 years. However, using a

blending of the current capital market assumptions from independent sources and LABF's current asset allocation, produced a median annual return of 7.08 percent over the next 20 years.

- **General wage inflation and payroll growth assumption**: We recommend a general wage inflation assumption of 0.75 percentage points above inflation, or 3.00 percent. This assumption serves as the across-the-board portion of salary increases and the rate at which the pay at hire is assumed to increase in future years for projection purposes.

- **Salary increase**: We reviewed salary experience for the period from January 1, 2012, to December 31, 2016. Overall, salaries did not increase as much as assumed. We determined salary increases between actuarial valuations and calculated average annual salary increases. Rates were increased for members during the first three years and seventh year of service and decreased for the remaining years of service with underlying wage inflation of 3.00 percent. On an aggregate basis the proposed salary increase assumptions are lower than the currently assumed salary increase rates.

Mortality Assumptions

- We recommend updating post-retirement mortality tables to the most recently published national "blue collar" tables, the RP-2014 Blue Collar Healthy Annuitant Mortality tables. We also recommend assuming mortality rates will improve in the future using a fully generational approach, but with the most recently published projection scale, MP–2017. These new mortality tables are a move from a single-dimensional age-based table to a two-dimensional table, where the year a person was born also influences their mortality rate.

- We recommend updating pre-retirement mortality tables for active employees to the most recently published national "blue collar" tables, the RP-2014 Blue Collar Employee mortality tables. We also recommend assuming mortality rates will improve in the future using a fully generational approach, but with the most recently published projection scale, MP–2017.

- We recommend applying certain scaling factors to the base tables based on the actual mortality experience and the credibility that can be applied to that experience.

Other Demographic Assumptions

- **Retirement rates**: We continue to recommend using predominantly service-based rates with higher rates at older ages. The actual rates of retirement were less than expected for all ages signifying that members are retiring later and in less numbers than expected. We recommend decreasing rates for all age and service bands.

- **Turnover rates**: Overall, the observed experience showed that fewer members terminated employment than expected. We recommend modifications to the current service based rates. These modifications include increasing the rate of termination during a member's first year of service and decreasing rates for service beyond one year.

- **Disability rates**: We recommend continuing to value disability as a term cost only, as a majority of disabilities were short-term in nature. We recommend that disability costs be increased from 2.50 percent of payroll to 3.00 percent of payroll and continued to be valued as a term cost. We believe that it is appropriate to continue considering these members as active members that are expected to accrue additional future benefits and load the normal cost to reflect near-term cash flow for the disability benefits. We will review the data periodically to ensure that the assumption remains reasonable.

Actuarial Methods and Policies

- **Cost method**: The actuarial cost method is Entry Age Normal, which is required to be used by State Statute.

- **Amortization method**: The State Statute requires fixed City contributions for payment years 2018 through 2022 and level percentage of pay contributions thereafter, such that the funded ratio reaches 90 percent by the end of 2058. There is no separate amortization of the unfunded accrued liability that leads to a 100 percent funding of the accrued liability. This funding method may not comply with generally accepted actuarial principles for the funding of a retirement fund because the funding method targets 90 percent instead of 100 percent.

- **Asset smoothing method**: The asset smoothing method is also defined by State Statute. Gains and losses, the difference between the actual investment return and expected investment return, are smoothed in over a five-year period at a rate of 20 percent per year.

- **Administrative expenses**: We continue to recommend including administrative expenses as an additional component of the normal cost. Administrative expenses are based on the previous years' administrative expenses increased by the inflation assumption (2.25 percent) and discounted to the beginning of year. Future administrative expenses, for projection purposes, are assumed to increase at the assumed rate of inflation.

- **Dependent assumptions**: Dependent assumptions for current active members are used in the actuarial valuation for purposes of valuing liabilities for pre and post-retirement death benefits. We recommend decreasing the current marriage assumption from 85 percent to 75 percent based on the demographics of the valuation census data over the experience study period. The male spouse is assumed to be three years older than the female spouse. No dependent assumptions are made for current retirees as actual eligible spouse data is provided.

- **Decrement timing**: We recommend maintaining decrement timing of middle of year.

SECTION C

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Analysis of Experience and Recommendations

Economic Assumptions

Economic assumptions reflect the effects of economic forces on the projections of retirement benefits payable from the plan and in the discounting of those benefits to present value.

These assumptions are based, at their core, on the assumed level of price inflation. Each economic assumption is then developed from expected spreads over price inflation.

The key economic assumptions are:

- Assumed Rate of Inflation – The rate of price inflation (as measured by the Consumer Price Index for all Urban consumers) which underlies the remainder of the economic assumptions.
- Assumed Rate of Investment Return – The rate at which projected future benefits under the pension plan are reduced to present value.
- Rate of General Annual Pay Increases – This reflects inflationary forces on increases in pay for individual members.

Actuarial Standards of Practice No. 27

Actuarial Standards of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries on giving advice on selecting economic assumptions for measuring obligations for defined benefit plans. ASOP No. 27 was revised and adopted by the Actuarial Standards Board (ASB) in September 2013 (applicable to valuation dates on or after September 30, 2014). The standard requires that the selected economic assumptions be consistent with each other. That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions.

As no one knows what the future holds, it is necessary for an actuary to estimate possible future economic outcomes. Recognizing that there is not one right answer, the current standard calls for an actuary to develop a reasonable economic assumption. A reasonable assumption is one that is:

1. Appropriate for the purpose of the measurement;
2. Reflects the actuary's professional judgment;
3. Takes into account historical and current economic data that is relevant as of the measurement date;
4. Is an estimate of future experience; an observation of market data; or a combination thereof; and
5. Has no significant bias except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

However, the standard explicitly advises an actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular actuarial valuation, each economic assumption should be consistent with every other economic assumption over the measurement period. Generally, the economic assumptions are much more subjective in nature than the demographic assumptions.

Inflation Assumption

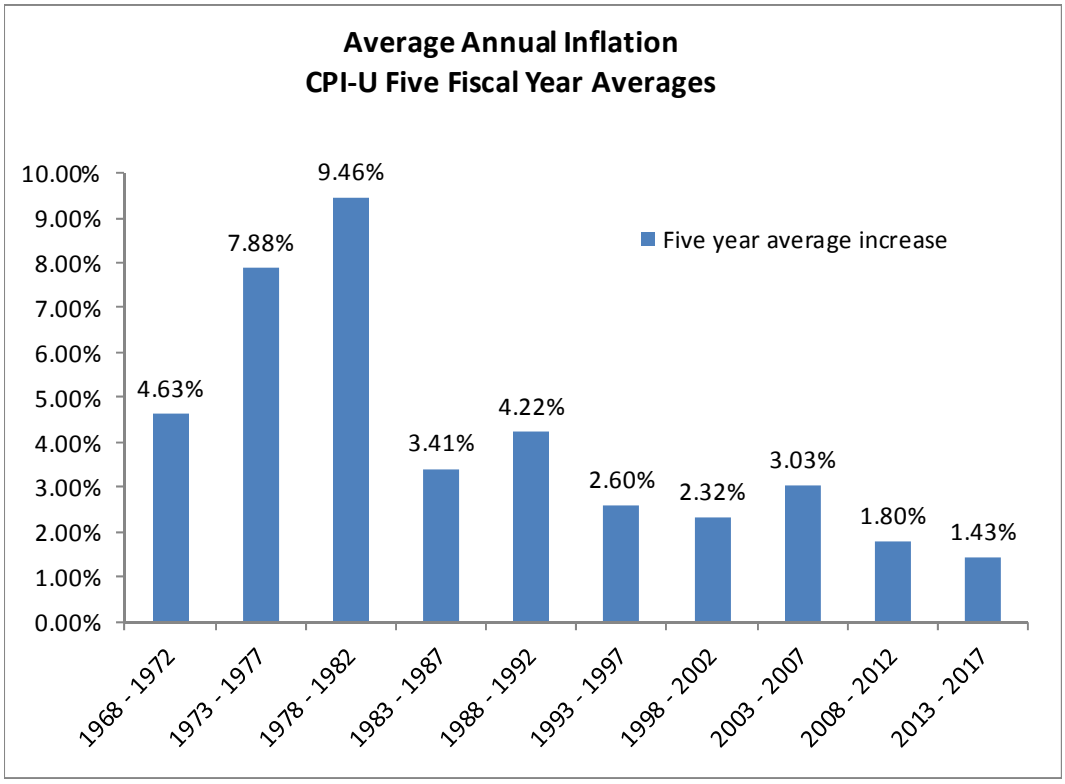
By "inflation," we mean price inflation, as measured by annual increases in the Consumer Price Index ("CPI"). This inflation assumption underlies most of the other economic assumptions. It affects investment return, salary increases, and overall payroll growth. The current annual inflation assumption is 3.00 percent. This assumption was left unchanged in the last experience study.

Over the five-year period from January 2013 through December 2017, the CPI-U has increased at an average rate of 1.43 percent.

The following table shows the average inflation over various periods, ending December 2017.

Fiscal Year	Annual Increase in CPI-U
2012	1.74%
2013	1.50%
2014	0.76%
2015	0.73%
2016	2.07%
2017	2.11%
3-Year Average	1.64%
5-Year Average	1.43%
10-Year Average	1.61%
20-Year Average	2.14%
25-Year Average	2.23%
30-Year Average	2.56%
40-Year Average	3.51%
50-Year Average	4.05%

The following graph shows the average annual inflation, as measured by the increase in CPI-U, in each of the 10 consecutive 5-year periods over the last 50 years.



As the above chart illustrates, the high inflation of the 1970s and 1980s is well in the past. The geometric average price inflation was 2.56 percent per year over the last 30 years from December 1987 to December 2017, 2.14 percent over the last 20 years and 1.61 percent over the last 10 years.

Future Inflation Expectations

Since price inflation is relatively volatile and is subject to a number of influences not based on recent history, economic assumptions are less reliably based on recent past experience than are the demographic assumptions. Therefore, it is important not to give undue weight to recent experience. We must also consider future expectations as well.

One source of information about future inflation is the market for US Treasury bonds. Simplistically, the difference in yield between non-inflation-indexed and inflation-indexed treasury bonds should be a reasonable estimate of what the bond market expects on a forward looking basis for inflation. As of the end of December, the difference for 20-year bonds implies that inflation over the next 20 years would average 1.92 percent. The difference in yield for 30-year bonds implies 1.97 percent inflation over the next 30 years.

However, this analysis is known to be imperfect as it ignores the inflation risk premium that buyers of US Treasury bonds often demand as well as possible differences in liquidity between US Treasury bonds and Treasury Inflation Protected Securities (TIPS).

We also surveyed the inflation assumption used by various investment consulting firms. In our sample of these firms, the inflation assumption ranged from 2.00 percent to 2.75 percent, with an average of 2.25 percent.

Another point of reference is the Social Security Administration's (SSA) 2017 Trustees Report, in which the Office of the Chief Actuary is projecting a long-term average ultimate annual inflation rate of 2.6 percent under the intermediate cost assumption. The ultimate inflation assumption is 2.0 percent and 3.2 percent respectively in the high cost and low cost projection scenarios. The Social Security Trustees report uses the ultimate rates for their 75-year projections, much longer than the longest horizon we can discern from Treasuries and TIPS.

The following table presents a summary of inflation rate forecasts from various professional experts.

Forward-looking Annual Inflation Forecasts (From Professional Experts in the Field of Forecasting Inflation)	
Federal Reserve Board's Federal Open Market Committee	
Current Long-run Price Inflation Objective (Since Jan 2012; Personal Consumer Expenditures)	2.00%
Congressional Budget Office: *The Budget and Economic Outlook*	
Overall Consumer Price Index (June 2017; Ultimate)	2.40%
Overall Consumer Price Index (June 2017; 11 Years)	2.36%
Personal Consumer Expenditures (June 2017; Ultimate)	2.00%
Personal Consumer Expenditures (June 2017; 11 Years)	1.98%
2017 Social Security Trustees Report	
CPI-W 15-Year Intermediate Assumption	2.60%
CPI-W 30-Year Intermediate Assumption	2.60%
GDP Deflator 15-Year Intermediate Assumption	2.20%
GDP Deflator 30-Year Intermediate Assumption	2.20%
Quarterly Survey of Professional Forecasters	
1Q2018 Federal Reserve Bank of Philadelphia 10-Year Forecast	2.25%
Federal Reserve Bank of Cleveland	
30-Year Expectation on January 1, 2018	2.21%
20-Year Expectation on January 1, 2018	2.10%
10-Year Expectation on January 1, 2018	1.92%
Bond Investors (Excess Yield of Non-indexed Treasuries Over Indexed Treasuries)	
30-Year Expectation on June 30, 2017	1.85%
Median 30-year Expectation over 6/30/12 - 6/30/17	2.09%
20-Year Expectation on June 30, 2017	1.77%
Median 20-year Expectation over 6/30/12 - 6/30/17	2.02%
10-Year Expectation on June 30, 2017	1.73%
Median 10-Year Expectation over 6/30/12 - 6/30/17	1.96%
Investment Consultants and Forecasters	
2017 GRS Survey major national investment forecasters and consultants	
Median expectation among 8 firms (averaging 9.4 years)	2.25%
Median expectation among 4 firms (averaging 26.3 years)	2.21%
2017 HAS Survey of 12 investment advisors: Median (10 years)	2.32%
2017 HAS Survey of 12 investment advisors: Median (20 years)	2.44%

Recommendation

Based on this information, our opinion is that it would be reasonable to lower the current price inflation assumption of 3.00 percent. However, we caution against lowering the price inflation assumption too low (i.e., below 2.00 percent). (The Federal Reserve's target and the Social Security Trustees' ultimate high cost assumptions are both 2.00 percent.) We are recommending the inflation assumption be reduced from 3.00 percent to 2.25 percent. This reduction recognizes lower inflation expectations in both the near and longer term. The change will bring it closer to recent inflation levels and closer to levels expected in the financial markets. As you will see, this change also affects all other economic assumptions.

Retiree Cost-of-Living Adjustment ("COLA") and Increases in the Pay Cap for Pensionable Pay for Participants Hired on and After January 1, 2011

Automatic annual increases in the retirement annuity differ for employees who first become a participant before or on or after January 1, 2011. Employees who first become a participant before January 1, 2011, receive an increase equal to 3.00 percent of the current retirement annuity amount. Employees who first become a participant on or after January 1, 2011, receive an increase equal to the lesser of 3.00 percent or one-half the annual change in the Consumer Price Index-U, whichever is less, based on the originally granted retirement annuity.

Based on the recommended price inflation assumption of 2.25 percent, we recommend a retiree COLA assumption of 1.125 percent for employees who first become a participant on or after January 1, 2011.

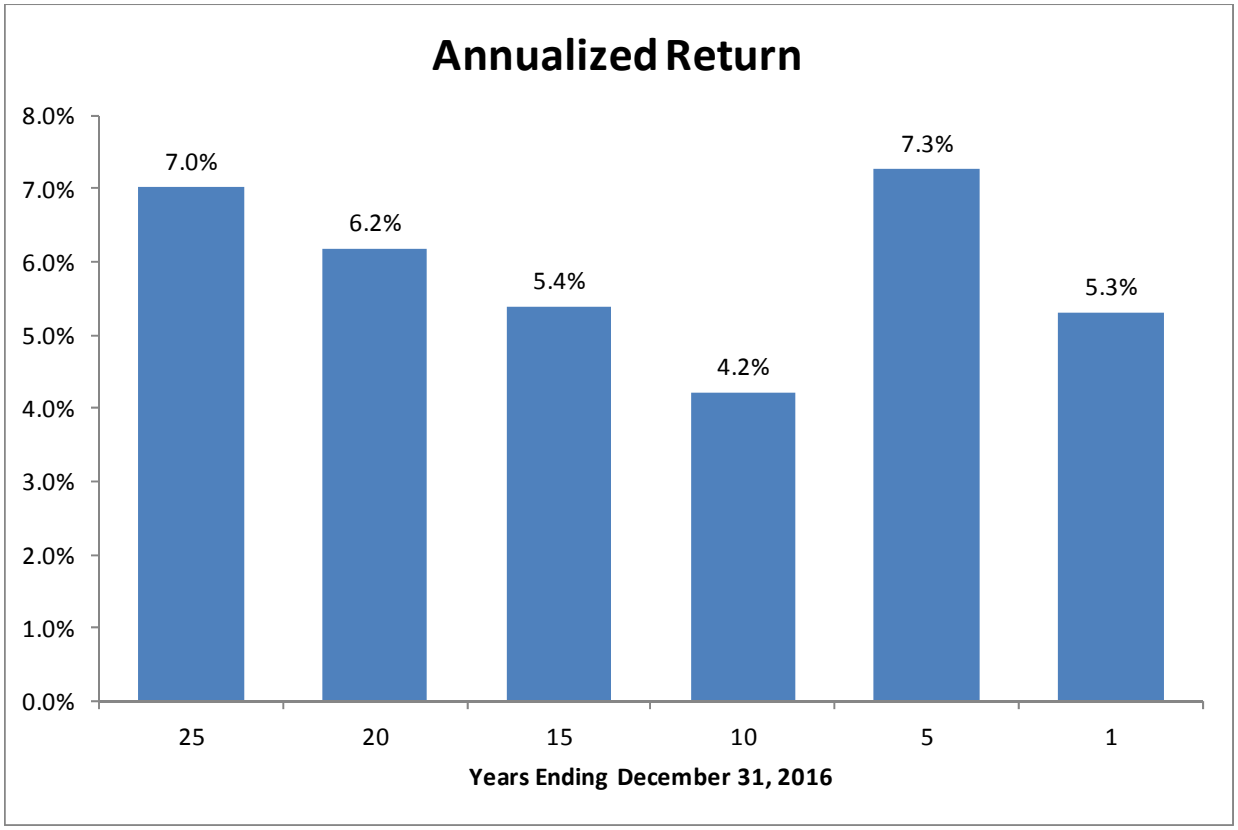
For participants who first became members on and after January 1, 2011, pensionable salary, upon which benefits and member contributions are based, is limited to $106,800 in 2011 and increased by the lesser of 3.00 percent and one-half of the annual unadjusted percentage increase in the Consumer Price Index-U (but not less than zero) as measured in the preceding 12-month period ending with the September preceding the November 1, which is the date that the new amount will be calculated and made available to the pension funds.

Based on the recommended price inflation assumption of 2.25 percent, we recommend an assumption of 1.125 percent for future increases in the pay cap for pensionable pay.

Investment Return Assumption

The investment return assumption is one of the principal assumptions used in any actuarial valuation of a retirement plan. It is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates. Currently, it is assumed that future investment returns will average 7.50 percent per year, net of investment expenses.

The chart below shows the historical annualized history of LABF market returns through fiscal year 2016.



Real Return

The allocation of assets within the universe of investment options will have a significant impact on the overall performance. Therefore, it is meaningful to identify the range of expected returns based on the fund's targeted allocation of investments and an overall set of capital market assumptions.

The following table provides the Fund's current target asset allocation as provided by LABF and their investment consultant, Marquette Associates.

Asset Class	Current Target
Broad Fixed Income	10.00%
Liquid Opportunistic Credit	7.00%
Emerging Market Debt	3.00%
Total Fixed Income	**20.00%**
U.S. Large-Cap Core	16.00%
U.S. Smid-Cap Core	9.00%
Total U.S. Equity	**25.00%**
Global Low Volatility	5.00%
Developed Large-Cap	10.00%
Non-U.S. Small-Cap	5.00%
Emerging Market	3.00%
Emerging Market Small-Cap	2.00%
Total Non-U.S. Equity	**25.00%**
Equity - Hedged	5.00%
Hedged Credit	5.00%
Total Hedge Funds	**10.00%**
Real Estate - Core	5.00%
Opportunistic Real Estate	5.00%
Total Real Assets	**10.00%**
Illiquid Real Assets	3.00%
Private Equity - Fund of Funds	4.00%
Private Debt	3.00%
Total Illiquid Assets	**10.00%**
Total	**100.00%**

Based on an analysis performed by Marquette Associates, which includes capital market assumptions developed by Marquette Associates, the current target asset allocation produces a median return (50th percentile) of 7.8 percent per year gross of investment fees over the next 10 years.

For comparison purposes, we applied the Fund's target asset allocation, and performed a similar analysis using capital market assumptions from a sample of 10 nationally known investment consulting firms. Four of the investment consulting firms provided us with capital market expectations for longer time horizons (20 to 30 years). Eight firms provided us with capital market expectations for shorter time horizons (10 years or less).

These investment consulting firms periodically issue reports that describe their capital market assumptions; that is, their estimates of expected returns, volatility and correlations among the different asset classes. The assumptions for most of the investment consultants are for 2017. While some of these assumptions may be based upon historical analysis, many of these firms also incorporate forward-looking

adjustments to better reflect near-term and long-term expectations. The estimates for core investments (i.e., fixed income, equities and real estate) are generally based on anticipated returns produced by passive index funds, and do not consider additional returns which may be generated through active management.

Given LABF's current target asset allocation and the capital market assumptions from the investment consultants, the development of the expected one-year nominal return, net of investment expenses, is provided in the following tables.

Investment Consultants with Short-term Investment Horizon (10 years or less) Assumptions

Investment Consultant	Investment Consultant Expected Nominal Return Net of Expenses	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return Net of Expenses (4)+(5)	Annualized Standard Deviation of Expected Return
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	6.14%	2.20%	3.94%	2.25%	6.19%	13.29%
2	6.80%	2.26%	4.54%	2.25%	6.79%	10.79%
3	7.19%	2.50%	4.69%	2.25%	6.94%	13.75%
4	7.29%	2.50%	4.79%	2.25%	7.04%	13.13%
5	6.84%	2.00%	4.84%	2.25%	7.09%	12.40%
6	7.75%	2.21%	5.54%	2.25%	7.79%	13.16%
7	7.92%	2.25%	5.67%	2.25%	7.92%	15.66%
8	8.03%	2.25%	5.78%	2.25%	8.03%	11.58%
Average	**7.25%**	**2.27%**	**4.97%**	**2.25%**	**7.22%**	**12.97%**

Investment Consultants with Long-term Investment Horizon (20 to 30 years) Assumptions

Investment Consultant	Investment Consultant Expected Nominal Return Net of Expenses	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return Net of Expenses (4)+(5)	Annualized Standard Deviation of Expected Return
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	7.33%	2.00%	5.33%	2.25%	7.58%	12.30%
2	7.55%	2.21%	5.34%	2.25%	7.59%	12.63%
3	8.39%	2.75%	5.64%	2.25%	7.89%	13.13%
4	8.23%	2.20%	6.03%	2.25%	8.28%	13.16%
Average	**7.87%**	**2.29%**	**5.58%**	**2.25%**	**7.83%**	**12.80%**

Based on each investment consulting firm's assumptions, we estimated the expected real return of LABF's portfolio (col. (4)). Next, based on the actuary's recommended inflation, we estimated the nominal return net of expenses (col. (6)). As the tables show, the average one-year nominal return (net of expenses) of the firms with a short-term investment horizon is 7.22 percent, and 7.83 percent using firms with long-term investment horizon, compared to the current investment return assumption of 7.50 percent.

However, in addition to examining the expected one-year arithmetic return, it is very important to review anticipated volatility of the investment portfolio and understand the range of long-term net returns that could be expected to be produced by the investment portfolio.

The following tables provide the 40th, 50th and 60th percentiles of the geometric average (10-year for short-term investment horizon and 20-year for long-term investment horizon) of the expected nominal return, net of expenses based on the recommended inflation assumption of 2.25 percent. The tables also show the probability of exceeding the current 7.50 percent assumption and alternative lower assumptions.

Investment Consultants with Short-term Investment Horizon (10 years or less) Assumptions

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding 7.50%	Probability of exceeding 7.25%	Probability of exceeding 7.00%
	40th	50th	60th			
(1)	(2)	(3)	(4)	(5)	(6)	(6)
1	4.32%	5.37%	6.42%	30.56%	32.66%	34.82%
2	5.39%	6.25%	7.11%	35.68%	38.44%	41.26%
3	4.98%	6.07%	7.16%	37.02%	39.21%	41.44%
4	5.21%	6.24%	7.29%	38.05%	40.37%	42.72%
5	5.40%	6.38%	7.37%	38.70%	41.16%	43.67%
6	5.96%	7.00%	8.04%	45.14%	47.54%	49.96%
7	5.57%	6.80%	8.04%	44.32%	46.34%	48.38%
8	6.50%	7.41%	8.34%	49.03%	51.78%	54.52%
Average	**5.42%**	**6.44%**	**7.47%**	**39.81%**	**42.19%**	**44.60%**

Investment Consultants with Long-term Investment Horizon (20 to 30 years) Assumptions

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.50%	Probability of exceeding 7.25%	Probability of exceeding 7.00%
	40th	50th	60th			
(1)	(2)	(3)	(4)	(5)	(6)	(6)
1	6.20%	6.88%	7.58%	41.06%	44.65%	48.29%
2	6.15%	6.85%	7.56%	40.89%	44.38%	47.92%
3	6.37%	7.10%	7.84%	44.59%	48.00%	51.43%
4	6.75%	7.49%	8.23%	49.80%	53.23%	56.64%
Average	**6.37%**	**7.08%**	**7.80%**	**44.08%**	**47.56%**	**51.07%**

As these tables indicate, the average expected rate of return at the 50th percentile based on (1) LABF's current target asset allocation, (2) the recommended inflation assumption of 2.25 percent and (3) the capital market assumptions from the investment consultants is 6.44 percent under the shorter term investment horizon and 7.08 percent under the longer term investment horizon.

Additionally, the average results of the investment firms with shorter term expectations indicate there is about a 39.8 percent chance that the Fund will produce an average return that exceeds 7.50 percent in the next 10 years, a 42.2 percent chance that the average return exceeds 7.25 percent and a 44.6 percent chance that the average return exceeds 7.00 percent.

The average results of the investment firms with longer term expectations indicate there is about a 44.1 percent chance that the Fund will produce an average return that exceeds 7.50 percent in the next 20 years, a 47.6 percent chance that the average return exceeds 7.25 percent and a 51.1 percent chance that the average return exceeds 7.00 percent.

A very important fact to consider when deciding what weight to put on shorter term results or longer term results is the amount of benefits that are projected to be paid in the next 10 years. As shown in the following table, about 52 percent of the actuarial accrued liability as of December 31, 2016, is attributable to benefits that are projected to be paid in the next 10 years. Therefore, it is extremely important to consider shorter term expectations in addition to longer term expectations when setting the economic assumptions.

LABF Values as of December 31, 2016 ($ in Millions)		
(1) Actuarial Accrued Liability (7.50%)	$	2,509.27
(2) Market Value of Assets	$	1,167.74
(3) Present Value of Benefit Payments in Next 10 years at 7.50%	$	1,299.44
as % of Current Liability (3)/(1)		**52%**
(4) Present Value of Benefit Payments in Next 15 years at 7.50%	$	1,777.28
as % of Current Liability (4)/(1)		**71%**
(5) Present Value of Benefit Payments in Next 20 years at 7.50%	$	2,139.62
as % of Current Liability (5)/(1)		**85%**
(6) Present Value of Benefit Payments in Next 25 years at 7.50%	$	2,394.00
as % of Current Liability (6)/(1)		**95%**

Peer Group Comparison

The National Conference on Public Employee Retirement Systems (NCPERS) issued a publication in January 2018, entitled "2017 NCPERS Public Retirement System Study". As stated in the overview, "The average investment assumption is 7.5 percent. This is the same as 2016…about 85 percent of funds who have responded in 2017 have reduced their assumption or are considering doing so."

Analysis of Experience and Recommendations

Following is a table with the investment return assumptions used by other retirement funds in Illinois:

Retirement System/Fund	Investment Return Assumption
State Universities Retirement System of Illinois*	7.25%
State Employees' Retirement System of Illinois	7.00%
Teachers' Retirement System of Illinois	7.00%
Judges' Retirement System of Illinois	6.75%
General Assembly Retirement System of Illinois	6.75%
County Employees' and Officers' Annuity and Benefit Fund of Cook County*	7.50%
Forest Preserve District Employees' Annuity and Benefit Fund of Cook County*	7.50%
Public School Teachers Pension and Retirement Fund of Chicago	7.25%
Policemen's Annuity and Benefit Fund of Chicago	7.25%
Firemen's Annuity and Benefit Fund of Chicago*	7.50%
Illinois Municipal Retirement Fund	7.50%
Municipal Employees' Annuity and Benefit Fund of Chicago	7.50%
Park Employees' Annuity and Benefit Fund of Chicago	7.50%
Metropolitan Water and Reclamation District Retirement Fund	7.50%

** Undergoing an experience study.*

Recommendation

Based on our analysis of the expected investment return and the current target asset allocation, we recommend reducing the investment return assumption to 7.00 percent for the actuarial valuation as of December 31, 2017, reflecting an inflation assumption of 2.25 percent and a real rate of return of 4.75 percent. This recommendation falls within the range of expected geometric returns (i.e., 50th percentile) of 6.44 percent to 7.08 percent, based on the average of the investment consultants' expectations using short and long-term investment horizons.

We recommend that the assumed investment return be monitored for continued appropriateness between experience reviews. Also, any significant changes in the target asset allocation of LABF may warrant an additional review of the rate of return assumption.

We believe that this assumption can be supported by the Actuarial Standard of Practice No. 27. Under the Standard, all economic assumptions must be selected to be consistent with the purpose of the

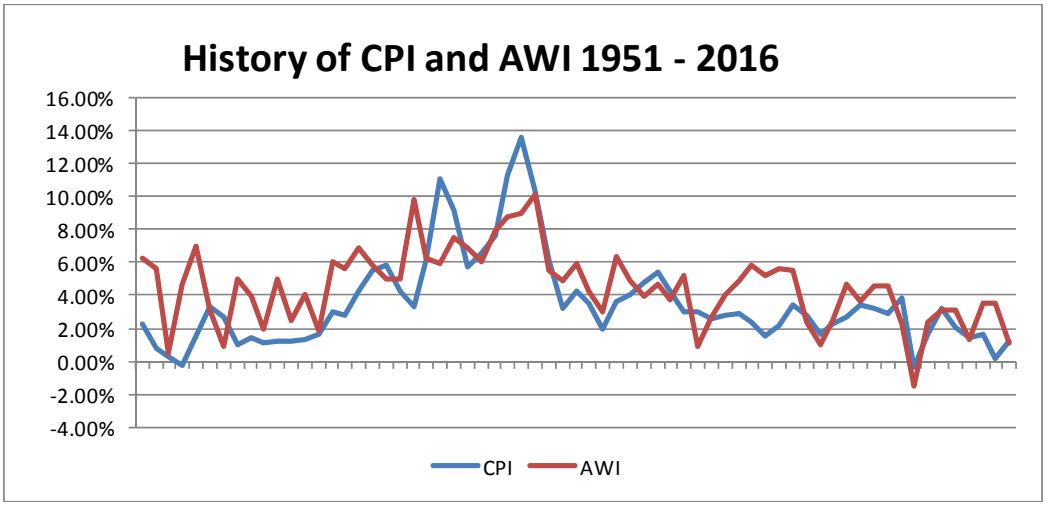
measurement. The purpose of the measurement is to determine the contribution rate which will lead to the accumulation of assets to pay benefits when due. The investment return assumption was last changed from 8.00 percent to 7.50 percent for the December 31, 2012, actuarial valuation.

General Wage Inflation and Payroll Growth

A General Wage Inflation ("GWI") assumption represents the real wage growth over time in the general economy. It is the assumption on how much the pay scales themselves will change year to year, not necessarily how much the pay increases received by individuals are, or even necessarily how the payroll in total may change, which can be affected by population changes, etc. Wage inflation consists of two components, (1) a portion due to pure price inflation (i.e., increases due to changes in the CPI), and (2) increases in average salary levels in excess of pure price inflation (i.e., increases due to changes in productivity levels, supply and demand in the labor market and other macroeconomic factors).

The Average Wage Index ("AWI"), formerly named the National Average Earnings ("NAE"), series published in connection with the operation of the Social Security program is a useful proxy for measuring general changes in wage levels in the economy. Increases in AWI typically exceed increases in the Consumer Price Index (CPI), although there are periods where the patterns are reversed. The economic argument for wages exceeding prices in the long run is that CPI is based on the prices of a fixed basket of goods whereas wages reflect innovations, real productivity growth, labor supply and demand and other factors in addition to pure price inflation.

The following graph compares CPI and AWI over the past 65 years.



The following table shows the average inflation and increase in the AWI through 2016.

Years	Annual Increases in		
	Prices (CPI-U)	Wages (AWI)	Difference
1957-1966	1.63%	3.41%	1.78%
1967-1976	5.78%	6.45%	0.67%
1977-1986	6.77%	6.50%	-0.27%
1987-1996	3.65%	4.11%	0.46%
1997-2006	2.54%	4.08%	1.54%
2007-2016	1.76%	2.33%	0.57%
3-Year Average	1.18%	2.71%	1.53%
5-Year Average	1.36%	2.51%	1.15%
10-Year Average	1.81%	2.33%	0.52%
20-Year Average	2.12%	3.20%	1.08%
25-Year Average	2.27%	3.26%	0.99%
30-Year Average	2.64%	3.50%	0.86%
40-Year Average	3.62%	4.24%	0.62%
50-Year Average	4.07%	4.68%	0.61%
60-Year Average	3.70%	4.47%	0.77%
64-Year Average	3.50%	4.46%	0.96%

Since 1951, for the national economy as a whole, wage inflation has been about 1.00 percent larger than price inflation each year. For the last 10 years, for the national economy as a whole, wage inflation has been 2.33 percent, outpacing price inflation by about 0.52 percent. However, that spread will likely be viewed as overstated due to the historically low inflation during the past decade. Over the past 10 years, the average salaries for LABF members have increased 2.08 percent per year while national average wages have increased 2.33 percent per year.

As with the investment return assumption, past experience does not necessarily dictate future expectations. Current expectations are mixed on whether price and wage inflation will remain low in the short term, particularly due to the after effects of recent federal government spending. For a long term view, the 2017 Annual Report from the Trustees of the Social Security Administration (SSA) assumes an intermediate average ultimate CPI of 2.6 percent over the next 75 years and an ultimate intermediate growth assumption for average wages in covered employment of 3.8 percent. The SSA report provides alternate "High-cost" assumptions of 2.0 percent CPI/2.6 percent wages and "Low-cost" assumptions of 3.2 percent CPI/5.0 percent wages.

The following table shows total and average payroll growth for LABF over the last 10 years.

Average Salary Increase						
Year Ending December 31,	Number of Active Members	Change in # of Actives	Covered Employee Payroll	Increase in Payroll	Average Employee Payroll	Increase in Average Payroll
2006	3,215		$193,176,272		$60,086	
2007	3,138	-2.40%	192,847,482	-0.17%	61,456	2.28%
2008	3,325	5.96%	216,744,211	12.39%	65,186	6.07%
2009	3,124	-6.05%	208,626,493	-3.75%	66,782	2.45%
2010	2,956	-5.38%	199,863,410	-4.20%	67,613	1.24%
2011	2,852	-3.52%	195,238,332	-2.31%	68,457	1.25%
2012	2,865	0.46%	198,789,741	1.82%	69,386	1.36%
2013	2,844	-0.73%	200,351,820	0.79%	70,447	1.53%
2014	2,837	-0.25%	202,673,014	1.16%	71,439	1.41%
2015	2,816	-0.74%	204,772,903	1.04%	72,718	1.79%
2016	2,822	0.21%	208,154,918	1.65%	73,761	1.44%
Average 5-yr Increase		**-0.21%**		**1.29%**		**1.50%**
Average 10-yr Increase		**-1.24%**		**0.84%**		**2.08%**

Recommendation

With the ongoing pressure on the ability of states to sustain across the board increases in wages is consistent with historical norms, we do not believe there is justification to increase the assumption for productivity increases; in other words, to increase the assumed gap between price increases and wage growth. In fact, we recommend maintaining the assumption for productivity increases of 0.75 percent. Combining this recommendation with our recommendation for price inflation of 2.25 percent implies a wage inflation assumption of 3.00 percent. These assumptions are summarized below:

	LABF Wage Inflation and Payroll Growth Assumption	
	Current Assumption	Recommended Assumption
Price Inflation	3.00%	2.25%
Productivity Increases	0.75%	0.75%
Total Wage Inflation	3.75%	3.00%

The payroll growth assumption is not used directly in the actuarial valuation or projections. However, it represents the rate at which total payroll is expected to ultimately increase in the absence of any pay caps.

Salary Increases

In order to project future benefits, the actuary must project future salary increases. Salaries may increase for a variety of reasons:

- Across-the-board increases for all employees;
- Across-the-board increases for a given group of employees;
- Increases to a minimum salary schedule;
- Additional pay for additional duties;
- Step or service-related increases;
- Increases for acquisition of advanced degrees or specialized training;
- Promotions;
- Overtime;
- Bonuses, if available; or
- Merit increases.

Our salary increase assumption is meant to reflect all of these kinds of increases to the extent that they are included in the pay used to determine contributions or plan benefits.

Most actuaries recommend salary increase assumptions that include an element that depends on the member's age or service, especially for large, state-wide retirement systems. They assume larger pay increases for younger or shorter-service employees. This is done in order to reflect pay increases that accompany changes in job responsibility, promotions, demonstrated merit, etc. The experience shows salaries continue to be more closely correlated to service (rather than age), as promotions and productivity increases tend to be greater in the first few years of a career, even if the new employee is older than the average new hire. For this reason, we will continue to use salary scales based on service.

As part of analyzing the salary increase assumption, we reviewed actual salary experience for the five-year period ended December 31, 2016, and the Collective Bargaining Agreement between LiUNA Local 1001 and the City of Chicago for the five-year term July 1, 2017, through June 30, 2022.

The components that determine the total salary increase are wage inflation, merit and longevity increases and promotion increases. Over the experience study period, actual salary increases for LABF members averaged 3.29 percent compared to expected total increases of 4.25 percent. During the same period, actual general inflation averaged 1.36 compared to the current assumption of 3.00 percent. This implies that actual real increases average 1.93 percent compared to the average expected real increase of 1.25 percent. Therefore, we recommend no change to the merit and longevity and promotion increase portion of the salary increase assumption. However, we recommend a decrease in the wage inflation portion of the salary increase assumption resulting in a decrease to the overall rates.

Observed experience for the first three years of service shows increases that were greater than expected. We recommend increasing rates during the first three years of service and decreasing rates for service periods of four or more years to better reflect actual experience.

This assumption was developed using both Tier One and Tier Two data and is applicable to both Tier One and Tier Two members.

Analysis of Experience and Recommendations

Table and Graph I compare the salary experience, current assumptions and recommended assumptions by years of service for each of the following:

- Table I – Salary Experience by Service
- Graph I – Salary Experience by Service

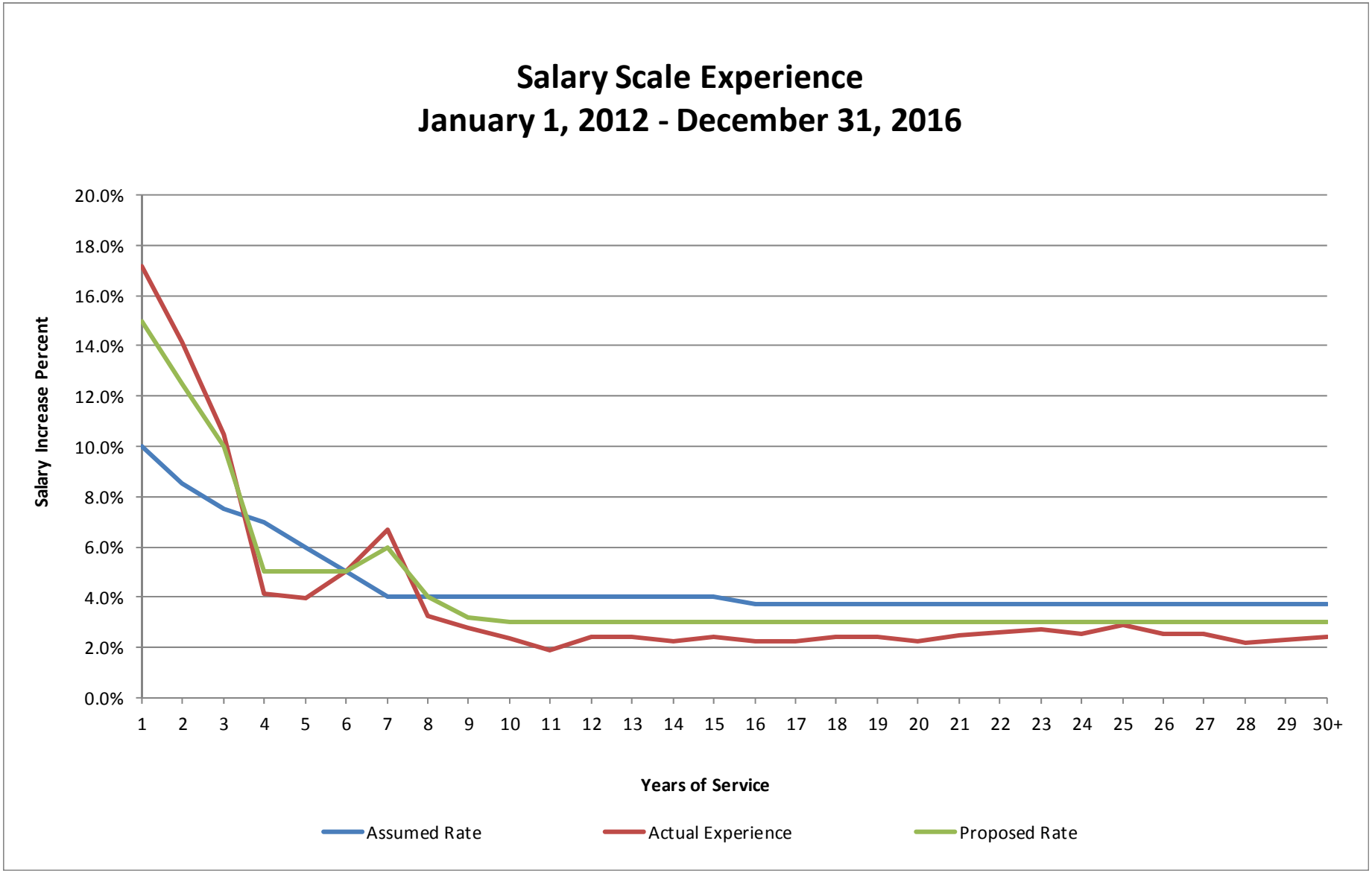
Table I

Service at End of Year	Number	Actual		Actual Real Increase[1]	Actual Total Increase	Expected Real Increase[2]	Expected Total Increase	Proposed Real Increase[3]	Proposed Total Increase
		Prior Year	Current Year						
1	107	5,514,961	6,462,157	15.82%	17.18%	7.00%	10.00%	12.75%	15.00%
2	599	29,593,920	33,785,109	12.84%	14.16%	5.75%	8.50%	10.25%	12.50%
3	465	27,122,790	29,957,227	9.09%	10.45%	4.50%	7.50%	7.75%	10.00%
4	338	22,360,031	23,280,907	2.76%	4.12%	4.00%	7.00%	2.75%	5.00%
5	275	19,118,163	19,879,410	2.62%	3.98%	3.00%	6.00%	2.75%	5.00%
6	157	10,444,842	10,968,021	3.65%	5.01%	2.00%	5.00%	2.75%	5.00%
7	272	17,571,301	18,744,850	5.32%	6.68%	1.00%	4.00%	3.75%	6.00%
8	269	18,351,702	18,944,492	1.87%	3.23%	1.00%	4.00%	1.75%	4.00%
9	319	22,056,925	22,673,790	1.44%	2.80%	1.00%	4.00%	0.95%	3.20%
10	327	22,774,969	23,305,776	0.97%	2.33%	1.00%	4.00%	0.75%	3.00%
11	340	24,248,884	24,702,693	0.51%	1.87%	1.00%	4.00%	0.75%	3.00%
12	341	23,378,779	23,937,746	1.03%	2.39%	1.00%	4.00%	0.75%	3.00%
13	593	40,667,202	41,661,200	1.08%	2.44%	1.00%	4.00%	0.75%	3.00%
14	715	49,417,337	50,536,632	0.91%	2.27%	1.00%	4.00%	0.75%	3.00%
15	786	54,862,409	56,178,230	1.04%	2.40%	1.00%	4.00%	0.75%	3.00%
16	877	62,086,287	63,482,097	0.89%	2.25%	0.75%	3.75%	0.75%	3.00%
17	774	55,487,860	56,745,180	0.91%	2.27%	0.75%	3.75%	0.75%	3.00%
18	662	47,621,954	48,764,080	1.04%	2.40%	0.75%	3.75%	0.75%	3.00%
19	629	45,689,520	46,783,754	1.04%	2.39%	0.75%	3.75%	0.75%	3.00%
20	571	42,418,230	43,374,795	0.90%	2.26%	0.75%	3.75%	0.75%	3.00%
21	453	34,146,154	34,999,046	1.14%	2.50%	0.75%	3.75%	0.75%	3.00%
22	474	36,099,096	37,039,340	1.25%	2.60%	0.75%	3.75%	0.75%	3.00%
23	451	34,272,090	35,196,989	1.34%	2.70%	0.75%	3.75%	0.75%	3.00%
24	363	27,369,604	28,070,771	1.20%	2.56%	0.75%	3.75%	0.75%	3.00%
25	324	24,205,916	24,909,547	1.55%	2.91%	0.75%	3.75%	0.75%	3.00%
26	314	23,772,759	24,371,128	1.16%	2.52%	0.75%	3.75%	0.75%	3.00%
27	247	18,936,692	19,419,010	1.19%	2.55%	0.75%	3.75%	0.75%	3.00%
28	189	14,531,776	14,848,244	0.82%	2.18%	0.75%	3.75%	0.75%	3.00%
29	178	13,918,780	14,238,874	0.94%	2.30%	0.75%	3.75%	0.75%	3.00%
30+	921	74,172,506	75,960,500	1.05%	2.41%	0.75%	3.75%	0.75%	3.00%
Total	**13,330**	**942,213,439**	**973,221,595**	**1.93%**	**3.29%**	**1.26%**	**4.25%**	**1.51%**	**3.76%**

	Actual	Proposed
Current	3.29%	3.76%
Previous Experience Study Results		
2004-2011	3.57%	4.31%

[1] *Total increase less average inflation of 1.36 percent over the experience study period.*
[2] *Total increase less assumed inflation of 3.00 percent.*
[3] *Total increase less proposed inflation of 2.25 percent.*

Graph I


Salary Scale Experience
January 1, 2012 - December 31, 2016
Salary Increase Percent
20.0%
18.0%
16.0%
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30+
Years of Service
Assumed Rate
Actual Experience
Proposed Rate

Demographic Assumptions

The following pages present the analysis of the demographic assumptions. These assumptions include assumed rates of mortality among active and retired members, retirement patterns, and turnover patterns. These patterns generally take the form of tables of rates of incidence based on age and/or years of service.

Absent any significant changes in benefit provisions, these assumptions generally exhibit reasonable consistency over periods of time. As a result, each demographic assumption is normally reviewed by relating actual experience to that assumed over the recent past.

The analysis of demographic experience is conducted for each assumption using a measure known as the "Actual to Expected (A/E) Ratio." The A/E Ratio is simply the ratio of the actual number of occurrences of the event to which the assumption applies (e.g., deaths or retirements) to the number expected to occur in accordance with the assumption. An A/E Ratio of 1.00 indicates that the assumption precisely predicted the number of occurrences. An A/E Ratio exceeding 1.00 indicates that the assumption underestimated actual experience. Conversely, an A/E Ratio lower than 1.00 indicates that the assumption overestimated actual experience.

These are statistical analyses. As a result, there are several considerations we must keep in mind as we analyze these ratios:

1. An actuarial assumption is designed to reflect average experience over long periods of time (30 - 50 years). As a result:

    a. A deviation between actual experience and that expected from our assumptions for one or two years does not necessarily mean that the assumption should be changed.

    b. A change in actuarial assumption should result if the experience indicates a consistent pattern which is different from that assumed over a period of years.

2. The larger the amount of data available, the more reliable the statistics used in the analysis. As a result:

    a. Events that occur with great frequency (e.g., general employment turnover) are more credibly predictable than those occurring less frequently (e.g., active member death).

    b. In all cases, data covering the entire study period produce more credible results than data for a single year.

    c. Year by year experience is helpful only in identifying trends and determining whether the four-year data is truly reflective of the entire period.

This analysis is based on the valuation data for the five-year period from January 1, 2012, to December 31, 2016.

Mortality

Post-retirement mortality is an important component in cost calculations and should be updated from time to time to reflect current and expected future longevity improvements. Pre-retirement mortality is a relatively minor component in cost calculations. The frequency of pre-retirement deaths is so low that mortality assumptions based on actual experience can only be produced for very large retirement systems.

Actuarial Standards of Practice

Actuarial Standards of Practice ("ASOP") No. 35 Disclosure Section 4.1.1 states, "The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the measurement date, the actuary should state that no provision was made for future mortality improvement." The current mortality rates used in the valuation include a provision for future mortality improvement.

The New Mortality Tables and Projection Scale

The Society of Actuaries' (SOA's) Retirement Plans Experience Committee ("RPEC") released updated mortality tables late in 2014 (the RP-2014 tables) which reflect the improvement in longevity of the studied group of private pension plan participants, and which also reflects projected future improvements for current and future generations of participants. The approach we have taken to recommending a mortality assumption for the LABF actuarial valuation is based on the RPEC 2014 model described by the Society of Actuaries ("SOA"). In effect, we select a base mortality table from the RP-2014 mortality tables (consisting of blue collar, white collar and total gender-specific base mortality tables for actives, retireds and disabled plan members) and a mortality improvement scale based on the 2-dimensional MP-2017 mortality improvement scales projected from the base year of 2006 after adjusting for MP-2014 improvements. Although it is anticipated that the SOA will release new improvement scales annually, for purposes of LABF actuarial valuations, we recommend maintaining the MP-2017 improvement scales until the next experience study. The mortality improvement scale is applied to the RP-2014 table to reflect improvements in mortality that are expected to occur with each new generation of participants.

Mortality Improvement Observations at a National Level

The updated mortality and mortality improvement tables show that among males age 65, overall longevity rose 2.0 years, from age 84.6 in 2000 to 86.6 in 2014. Saying it another way, men aged 65 in the year 2000 were expected to live to be 84.6 years old. Men aged 65 in the year 2014 were expected to live to be 86.6 years old. For women age 65, overall longevity rose 2.4 years from age 86.4 in 2000 to age 88.8 in 2014.

Findings

The mortality experience was reviewed on a benefit weighted basis for retired members in pay status and on a headcount basis for active members. The observed experience was compared to the current mortality table and an updated baseline table, i.e. the RP-2014 Blue Collar Annuitant Mortality Table for retirees and the RP-2014 Blue Collar Employee Mortality Table for active members.

The following table compares the actual number of benefit weighted deaths to the expected number of benefit weighted deaths for retired members:

	Benefits Weighted Deaths ($ in 100,000)		
	Expected Using Current Mortality Table (RP-2000 Combined Healthy)	Actual	Expected Using Updated Baseline Mortality Table (RP-2014 Blue Collar)
Male Retirees	$194	$208	$163
Female Retirees	$15	$20	$19

Although the experience has limited credibility, the experience on a benefit weighted basis shows that more retired members died than expected.

When compared to the current mortality table, the updated mortality table is expected to produce fewer benefit weighted deaths.

We applied credibility and "best-fit" factors to the baseline mortality table to recognize a portion of the observed mortality experience. The credibility factor applies more weight to the observed mortality experience as the sample size of the group and number of deaths increases. The "best-fit" factor compares actual deaths during the experience period to expected deaths during the period using a baseline mortality table. The following table shows the development of the scaling factor that is applied to the recommended base mortality table (RP-2014 Blue Collar Healthy Mortality) for retirees. The scaling factor increased baseline mortality rates by 17 percent for male retirees and 2 percent for female retires.

	Benefits Weighted Deaths ($ in 100,000)					
	Fully Credible Target Deaths Using Baseline Table [1] (a)	Observed Deaths (b)	Expected Deaths Using Baseline Table (c)	Credibility Factor (d)=(b/a)$^{1/2}$	Best Fit Factor (e)=(b)/(c)	Scaling Factor Applied to Baseline Table (d) x (e) + [1-(d)] x 100%
Male Retirees	$532	$208	$163	62%	128%	117%
Female Retirees	$239	$20	$19	28%	107%	102%

[1] *Minimum number of expected benefit weighted deaths needed for plan experience to be fully credible.*

The experience for active members is even less credible. During the experience period, the actual number of deaths of 57 was higher than the expected number of death of 38. The following table shows the development of scaling factors applied to the active member baseline mortality table, i.e. the RP-2014 Blue Collar Employee Mortality Table.

	Headcount Weighted Deaths					
	Fully Credible Target Deaths Using Baseline Table (a)	Observed Deaths (b)	Expected Deaths Using Baseline Table (c)	Credibility Factor (d)=(b/a)$^{1/2}$	Best Fit Factor (e)=(b)/(c)	Scaling Factor Applied to Baseline Table (d) x (e) + [1-(d)] x 100%
Male Employees	1,082	52	37	22%	142%	109%
Female Employees	1,082	5	4	7%	141%	103%

Recommendations

We reviewed the mortality experience separately for active members and service retirees during the five-year study period. The results are shown on the following pages.

Following is a summary of the current mortality assumptions:

Applicable Group	Base Table with 2000 Base Year	Male Set Back	Female Set Back	Male Multiplier	Female Multiplier
Pre-retirement	RP-2000 Combined Healthy Annuitant, sex distinct	-1 years	2 years	80%	80%
Post-retirement	RP-2000 Combined Healthy Annuitant, sex distinct	-1 years	2 years	100%	100%

Following is a summary of the recommended mortality assumptions:

Applicable Group	Base Mortality Table	Male Scaling Factor	Female Scaling Factor
Pre-retirement	RP-2014 Blue Collar Employee, sex distinct	109%	103%
Post-retirement	RP-2014 Blue Collar Healthy Annuitant, sex distinct	117%	102%

Future mortality improvements are reflected by projecting the base mortality tables back from the year 2014 to the year 2006 using the MP-2014 projection scale and projecting from 2006 using the MP-2017 projection scale.

A Note about Mortality Rates

The recommended mortality assumptions include generational mortality improvements, which means that the probability of a 60-year-old retired male dying in any particular year is lower for a 60-year old born in 1994 than a 60-year-old born in 1954.

The use of generational mortality tables is based on the assumption that life expectancy increases from generation to generation. Simply put, this means that the life expectancy of someone born in 1994 is greater than that of someone born in 1954.

The following tables and graphs contain the mortality experience for the experience study period:

- Table and Graph II(a) – Post-Retirement Mortality Experience
- Table and Graph II(b) – Pre-Retirement Mortality Experience

Table II(a)

Male Service Retiree Mortality Experience												
	Actual Experience						Current Assumptions			Proposed Assumptions		
	Population Weighted		Benefits Weighted		Actual Rates Weighted by		Expected	Assumed	Actual /	Expected	Proposed	Actual /
Age	Exposures	Deaths	Exposures	Deaths	Population	Benefits	Deaths	Rate	Expected	Deaths	Rate	Expected
Under 50	9	0	0	0	0.000%	0.000%	0	0.199%	0.00	0	0.353%	0.00
50-54	521	3	308	1	0.576%	0.425%	1	0.324%	1.31	2	0.649%	0.66
55-59	1,900	35	1,045	18	1.842%	1.739%	6	0.574%	3.03	9	0.862%	2.02
60-64	2,442	29	1,261	13	1.188%	1.043%	13	1.031%	1.01	15	1.189%	0.88
65-69	2,153	39	1,031	18	1.811%	1.712%	18	1.747%	0.98	19	1.844%	0.93
70-74	1,847	71	848	31	3.844%	3.669%	26	3.064%	1.20	25	2.946%	1.25
75-79	1,456	54	633	26	3.709%	4.033%	33	5.214%	0.77	30	4.740%	0.85
80-84	979	94	385	41	9.602%	10.620%	34	8.822%	1.20	31	8.043%	1.32
85-89	681	93	255	37	13.656%	14.433%	38	14.903%	0.97	34	13.334%	1.08
90-94	302	59	92	17	19.536%	18.773%	21	22.732%	0.83	20	21.650%	0.87
95-99	51	19	15	5	37.255%	37.207%	4	27.509%	1.35	4	27.509%	1.35
100+	1	1	0	0	100.000%	100.000%	0	0.000%		0	0.000%	
Totals:	**12,342**	**497**	**5,874**	**208**	**4.027%**	**3.534%**	**194**	**3.303%**	**1.07**	**189**	**3.218%**	**1.10**
Female Service Retiree Mortality Experience												
Under 50	0	0	0	0			0	0.000%		0	0.000%	
50-54	4	0	2	0	0.000%	0.000%	0	0.000%		0	0.000%	
55-59	66	0	25	0	0.000%	0.000%	0	0.000%		0	0.000%	
60-64	125	3	43	1	2.400%	2.764%	0	0.000%		0	0.000%	
65-69	122	1	37	0	0.820%	1.159%	0	0.000%		0	0.000%	
70-74	104	1	26	0	0.962%	0.602%	0	0.000%		0	0.000%	
75-79	95	2	26	1	2.105%	2.178%	1	3.801%	0.57	1	3.801%	0.57
80-84	147	11	36	2	7.483%	5.860%	2	5.500%	1.07	2	5.500%	1.07
85-89	181	21	36	4	11.602%	12.142%	3	8.250%	1.47	3	8.250%	1.47
90-94	192	32	33	6	16.667%	16.744%	4	12.065%	1.39	5	15.081%	1.11
95-99	120	23	20	4	19.167%	20.883%	4	19.868%	1.05	5	24.835%	0.84
100+	39	10	5	1	25.641%	25.482%	1	18.395%	1.39	2	36.790%	0.69
Totals:	**1,195**	**104**	**292**	**20**	**8.703%**	**6.872%**	**15**	**5.144%**	**1.34**	**18**	**6.173%**	**1.11**
Grand Totals:	**13,537**	**601**	**6,166**	**228**	**4.440%**	**3.692%**	**209**	**3.390%**	**1.09**	**207**	**3.357%**	**1.10**

	Actual		Proposed
Current	4.440%	3.692%	3.357%
Previous Experience Study Results			
2004-2011	5.538%	N/A	4.704%

Expected deaths under the current and proposed assumptions are on a benefits weighted basis.

Graph II(a)

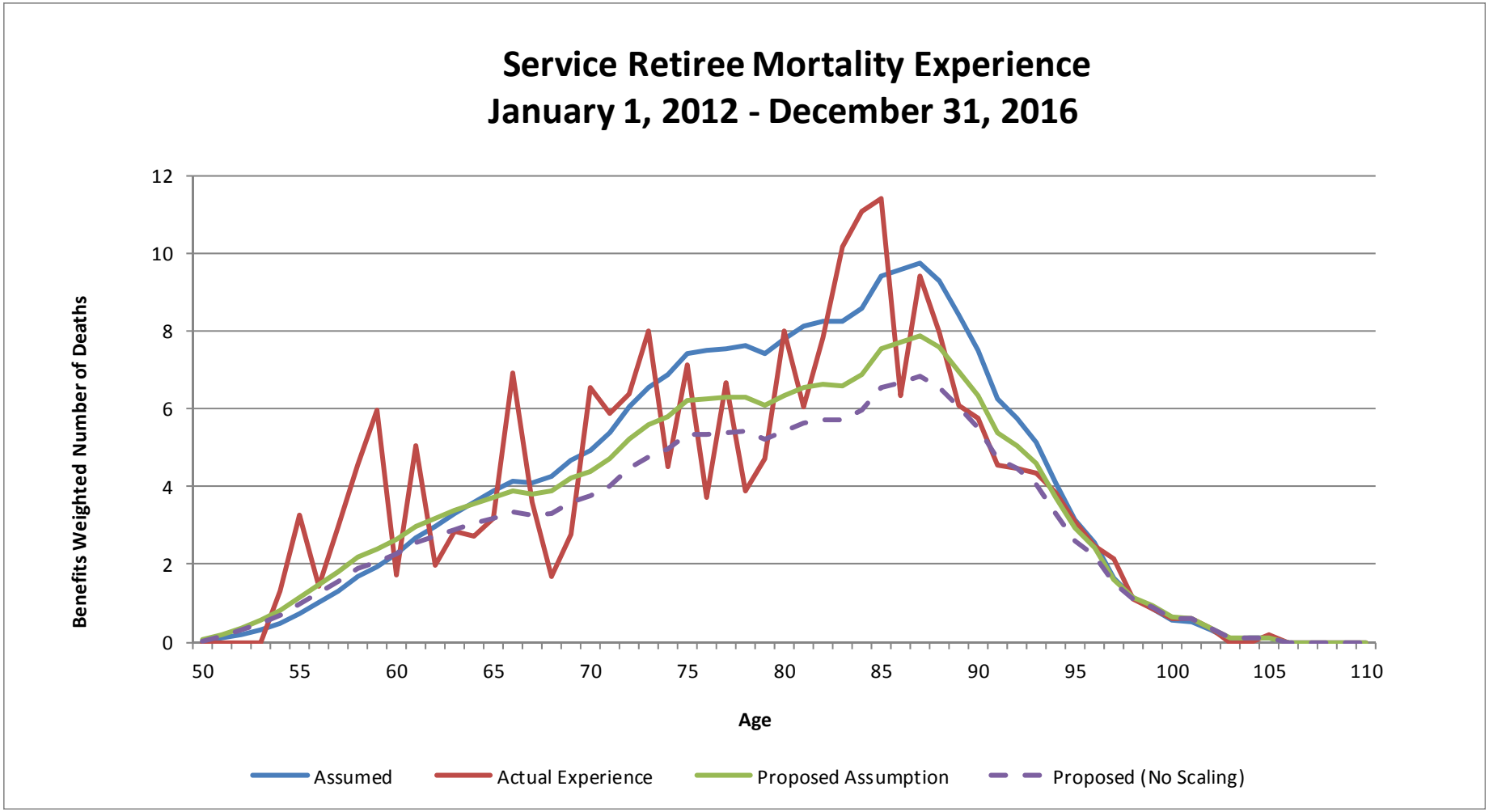

Service Retiree Mortality Experience
January 1, 2012 - December 31, 2016
Benefits Weighted Number of Deaths
0
2
4
6
8
10
12
50
55
60
65
70
75
80
85
90
95
100
105
110
Age
Assumed
Actual Experience
Proposed Assumption
Proposed (No Scaling)

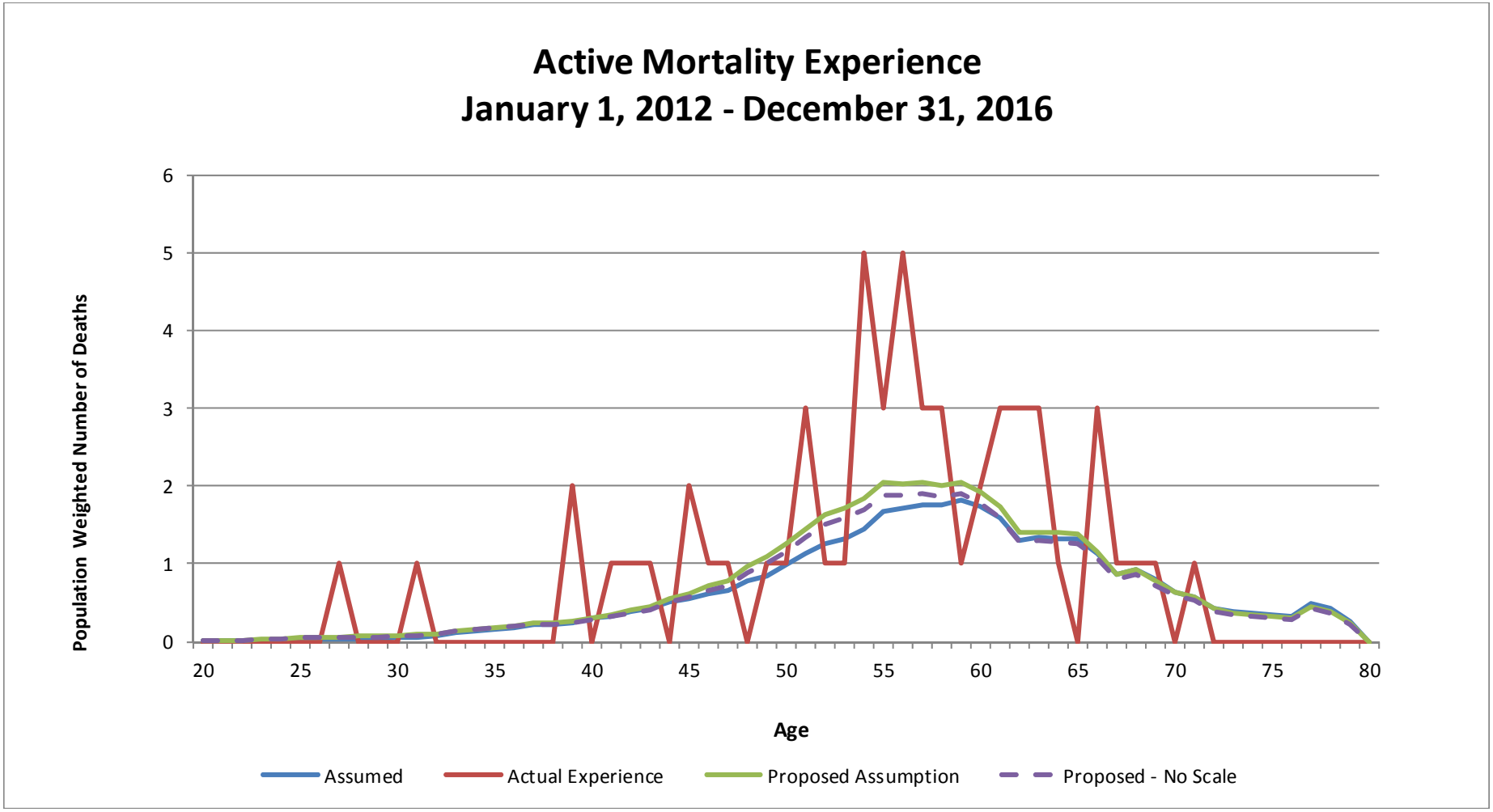
Table II(b)

Male Active Mortality Experience									
	Actual Experience			Current Assumptions			Proposed Assumptions		
	Population Weighted			Expected	Assumed	Actual /	Expected	Proposed	Actual /
Age	Exposures	Deaths	Actual Rate	Deaths	Rate	Expected	Deaths	Rate	Expected
Under 30	511	1	0.196%	0	0.032%	6.16	0	0.069%	2.84
30-39	1,837	2	0.109%	1	0.068%	1.60	1	0.081%	1.35
40-49	3,630	8	0.220%	5	0.131%	1.68	6	0.152%	1.45
50-59	4,185	25	0.597%	13	0.319%	1.87	16	0.392%	1.52
60-69	1,203	15	1.247%	11	0.935%	1.33	12	1.007%	1.24
70-79	137	1	0.730%	4	2.881%	0.25	4	2.819%	0.26
Totals:	**11,503**	**52**	**0.452%**	**35**	**0.302%**	**1.50**	**40**	**0.346%**	**1.31**
Less than 60:	**10,163**	**36**	**0.354%**	**20**	**0.192%**	**1.84**	**24**	**0.234%**	**1.51**
Female Active Mortality Experience									
	Population Weighted			Expected	Assumed	Actual /	Expected	Proposed	Actual /
Age	Exposures	Deaths	Actual Rate	Deaths	Rate	Expected	Deaths	Rate	Expected
Under 30	134	0	0.000%	0	0.016%	0.00	0	0.022%	0.00
30-39	535	1	0.187%	0	0.033%	5.62	0	0.038%	4.97
40-49	862	0	0.000%	1	0.074%	0.00	1	0.080%	0.00
50-59	855	1	0.117%	1	0.172%	0.68	2	0.192%	0.61
60-69	216	3	1.389%	1	0.494%	2.81	1	0.404%	3.44
70-79	19	0	0.000%	0	1.432%	0.00	0	1.012%	0.00
Totals:	**2,621**	**5**	**0.191%**	**4**	**0.139%**	**1.37**	**4**	**0.138%**	**1.38**
Less than 60:	**2,386**	**2**	**0.084%**	**2**	**0.097%**	**0.87**	**3**	**0.107%**	**0.78**
Grand Totals:	**14,124**	**57**	**0.404%**	**38**	**0.272%**	**1.49**	**43**	**0.307%**	**1.31**
Less than 60:	**12,549**	**38**	**0.303%**	**22**	**0.174%**	**1.74**	**26**	**0.210%**	**1.44**

	Actual	Proposed
Current	0.404%	0.307%
Previous Experience Study Results		
2004-2011	0.334%	0.209%

Expected deaths under the current and proposed assumptions are on a population weighted basis.

Graph II(b)


Active Mortality Experience
January 1, 2012 - December 31, 2016
Population Weighted Number of Deaths
0
1
2
3
4
5
6
20
25
30
35
40
45
50
55
60
65
70
75
80
Age
Assumed
Actual Experience
Proposed Assumption
Proposed - No Scale

Retirement

The Plan provisions establish the minimum eligibility requirements for retirement. Participants of the plan that became members before January 1, 2011, are eligible for immediate retirement benefits under the minimum annuity formula at the earlier of age 50 and 30 years of service, age 55 and 20 years of service, or age 60 and 10 years of service. (Benefits under the money purchase formula are available to members at least age 55 with 10 years of service.) Retirement cost, however, is determined not by the minimum eligibility requirements but by the ages at which members actually retire. The actuarial valuation does not assume that everyone retires at earliest eligibility. The assumption about timing of retirement once eligibility has been established is a major component in cost calculations. Note that higher rates of retirement at earlier retirement ages or years of service upon attaining retirement eligibility generally result in higher actuarially determined contributions, and vice versa.

Experience during the last five years was considered in the analysis shown on the following pages. The "Exposure" column shows the number of employees eligible to retire at various years of service or ages throughout the experience period. An individual could potentially be counted up to five times if eligible each year in the period. By tabulating employees in this fashion we are able to answer the question "For all employees eligible at condition X, how many retired?"

Actual rates of retirement were less than expected for all ages signifying that members are retiring later and in less numbers than expected. More specifically, for ages 55 through 64 actual retirements were considerably lower than expected. The trend of members remaining in active service until Medicare eligible is due in part to the uncertain future of the retiree health insurance supplement and other subsidized retiree healthcare benefits. To account for this, we recommend using 55 percent of the current rates for ages 55 through 64 and 70 percent of the current rates for the remaining age and service bands.

Applying the proposed rates to historical data generates the following number of retirements by **age** at retirement:

	Number of Retirements		
Age	Actual	Current Assumption	Proposed Assumption
50-54	91	111	78
55-59	142	277	157
60-64	109	195	122
65-69	72	113	86
70-74	24	35	27
75-79	4	13	10
80+	4	20	20
Total	**446**	**765**	**500**

Applying the proposed rates to historical data generates the following number of retirements by **service** at retirement:

Years of Service	Number of Retirements		
	Actual	Current Assumption	Proposed Assumption
Under 20	65	99	66
20-24	82	144	86
25-29	84	128	72
30-34	162	229	146
35-39	43	96	59
40+	10	70	70
Total	**446**	**765**	**500**

The tables and graphs on the following pages show experience first by age and then by service. The current and proposed retirement rates shown in these tables are blended rates based on the age and service of the exposures.

- Table and Graph III(a) – Retirement Experience by Age
- Table and Graph III(b) – Retirement Experience by Service

Table III(a)

Retirement Experience by Age									
	Actual Experience			Current Assumptions			Proposed Assumptions		
Nearest Age @ BOY	Exposures	Retirements	Actual Rate	Expected Retirements	Assumed Rate	Actual / Expected	Expected Retirements	Proposed Rate	Actual / Expected
50	47	17	36.2%	12	26.0%	1.4	9	18.4%	2.0
51	70	19	27.1%	20	28.6%	1.0	14	20.1%	1.3
52	80	19	23.8%	24	30.4%	0.8	17	21.4%	1.1
53	87	22	25.3%	27	31.3%	0.8	19	22.1%	1.1
54	90	14	15.6%	27	30.3%	0.5	19	21.4%	0.7
55	291	50	17.2%	68	23.4%	0.7	37	12.8%	1.3
56	253	23	9.1%	60	23.7%	0.4	33	13.0%	0.7
57	214	28	13.1%	53	24.9%	0.5	30	14.1%	0.9
58	196	14	7.1%	48	24.5%	0.3	28	14.3%	0.5
59	199	27	13.6%	48	24.2%	0.6	29	14.5%	0.9
60	293	26	8.9%	54	18.5%	0.5	32	11.0%	0.8
61	236	31	13.1%	42	17.9%	0.7	25	10.6%	1.2
62	174	15	8.6%	36	20.6%	0.4	23	13.3%	0.6
63	157	21	13.4%	34	21.8%	0.6	22	14.2%	0.9
64	136	16	11.8%	29	21.1%	0.6	19	13.8%	0.9
65	123	22	17.9%	34	27.5%	0.7	25	20.6%	0.9
66	94	23	24.5%	27	28.7%	0.9	20	21.8%	1.1
67	66	9	13.6%	20	30.4%	0.4	16	24.1%	0.6
68	64	10	15.6%	17	26.5%	0.6	13	20.0%	0.8
69	52	8	15.4%	15	28.7%	0.5	12	22.5%	0.7
70	36	8	22.2%	10	27.9%	0.8	7	20.5%	1.1
71	29	4	13.8%	8	28.3%	0.5	6	21.0%	0.7
72	21	3	14.3%	7	32.8%	0.4	5	26.0%	0.6
73	16	4	25.0%	6	36.5%	0.7	5	29.4%	0.8
74	14	5	35.7%	4	30.6%	1.2	3	23.7%	1.5
75	11	0	0.0%	3	24.0%	0.0	2	17.0%	0.0
76	9	0	0.0%	2	24.0%	0.0	2	17.0%	0.0
77	12	2	16.7%	3	28.0%	0.6	2	19.8%	0.8
78	9	2	22.2%	3	29.3%	0.8	2	20.7%	1.1
79	6	0	0.0%	3	42.0%	0.0	2	34.5%	0.0
80+	20	4	20.0%	20	100.0%	0.2	20	100.0%	0.2
Totals:	**3,105**	**446**	**14.4%**	**765**	**24.6%**	**0.6**	**500**	**16.1%**	**0.9**
Average Retirement Age:			**59.5**			**60.0**			**60.3**

	Actual	Proposed
Current	14.4%	16.1%
Previous Experience Study Results		
2004-2011	22.6%	24.5%

Graph III(a)

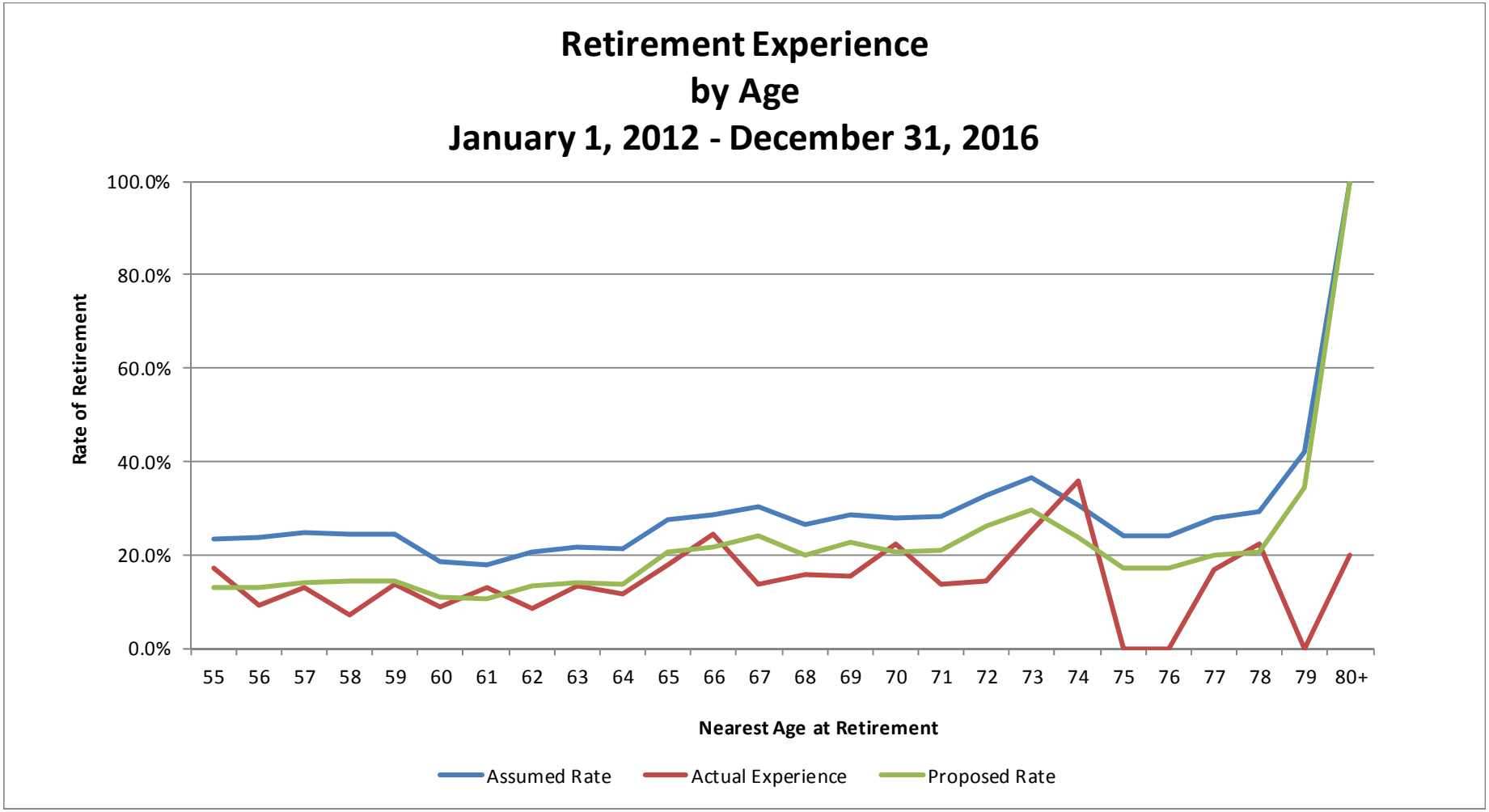
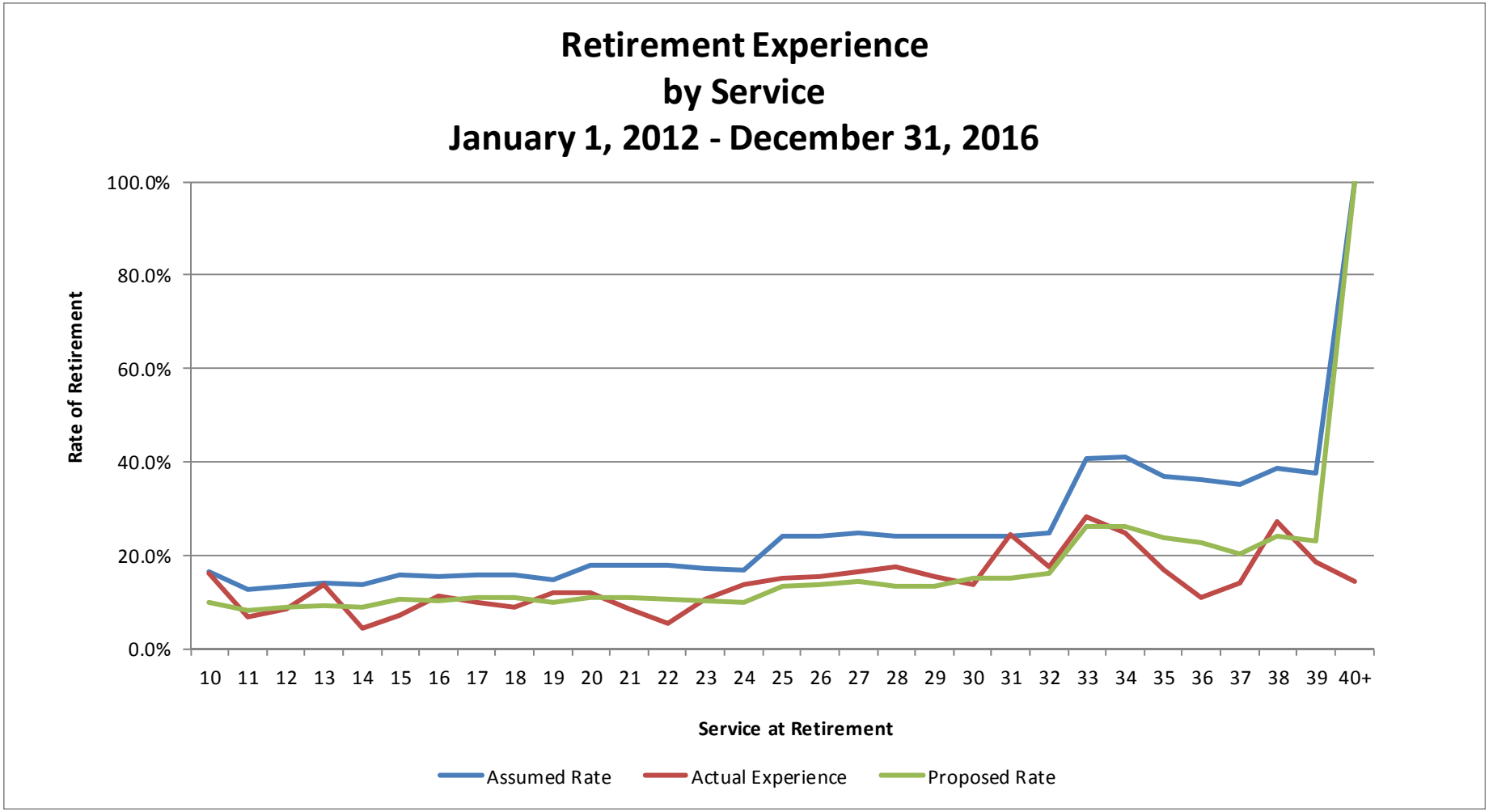

Retirement Experience
by Age
January 1, 2012 - December 31, 2016
Rate of Retirement
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80+
Nearest Age at Retirement
Assumed Rate
Actual Experience
Proposed Rate

Table III(b)

Retirement Experience by Service									
	Actual Experience			Current Assumptions			Proposed Assumptions		
Years of Service	Exposures	Retirements	Actual Rate	Expected Retirements	Assumed Rate	Actual / Expected	Expected Retirements	Proposed Rate	Actual / Expected
10	25	4	16.0%	4	16.3%	1.0	2	10.0%	1.6
11	29	2	6.9%	4	12.5%	0.6	2	8.1%	0.9
12	35	3	8.6%	5	13.3%	0.6	3	8.7%	1.0
13	58	8	13.8%	8	14.0%	1.0	5	9.2%	1.5
14	68	3	4.4%	9	13.6%	0.3	6	8.9%	0.5
15	84	6	7.1%	13	15.7%	0.5	9	10.5%	0.7
16	88	10	11.4%	13	15.3%	0.7	9	10.1%	1.1
17	90	9	10.0%	14	15.8%	0.6	10	10.8%	0.9
18	89	8	9.0%	14	15.7%	0.6	10	10.8%	0.8
19	101	12	11.9%	15	14.8%	0.8	10	10.0%	1.2
20	190	23	12.1%	34	17.8%	0.7	21	10.8%	1.1
21	154	13	8.4%	27	17.7%	0.5	17	10.8%	0.8
22	169	9	5.3%	30	17.7%	0.3	18	10.7%	0.5
23	172	18	10.5%	30	17.2%	0.6	17	10.2%	1.0
24	138	19	13.8%	23	16.8%	0.8	14	9.8%	1.4
25	127	19	15.0%	30	24.0%	0.6	17	13.4%	1.1
26	129	20	15.5%	31	24.0%	0.6	17	13.5%	1.1
27	104	17	16.3%	26	24.7%	0.7	15	14.5%	1.1
28	85	15	17.6%	20	24.0%	0.7	11	13.4%	1.3
29	84	13	15.5%	20	24.0%	0.6	11	13.4%	1.2
30	154	21	13.6%	37	24.0%	0.6	23	15.0%	0.9
31	156	38	24.4%	37	24.0%	1.0	24	15.2%	1.6
32	176	31	17.6%	44	24.9%	0.7	29	16.2%	1.1
33	153	43	28.1%	62	40.8%	0.7	40	26.1%	1.1
34	117	29	24.8%	48	41.0%	0.6	31	26.2%	0.9
35	89	15	16.9%	33	36.7%	0.5	21	23.7%	0.7
36	64	7	10.9%	23	36.3%	0.3	14	22.5%	0.5
37	43	6	14.0%	15	35.2%	0.4	9	20.3%	0.7
38	37	10	27.0%	14	38.6%	0.7	9	23.9%	1.1
39	27	5	18.5%	10	37.6%	0.5	6	23.0%	0.8
40+	70	10	14.3%	70	100.0%	0.1	70	100.0%	0.1
Totals:	**3,105**	**446**	**14.4%**	**765**	**24.6%**	**0.6**	**500**	**16.1%**	**0.9**

	Actual	Proposed
Current	14.4%	16.1%
Previous Experience Review Results		
2004-2011	22.6%	24.5%

Graph III(b)


Retirement Experience
by Service
January 1, 2012 - December 31, 2016
Rate of Retirement
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40+
Service at Retirement
Assumed Rate
Actual Experience
Proposed Rate

Turnover

Currently, turnover rates are based solely on service. Based on our analysis, no credible patterns of age-based terminations were present; therefore, we are recommending the service based structure.

We also examined turnover behavior between benefit groups (before and after January 1, 2011) and found subtle difference between the tiers. Thus, we recommend one set of turnover assumptions apply to all Tiers and will monitor Tier Two turnover as experience emerges.

It is not uncommon to have separate turnover rates for males and females. However, GRS examined LABF experience separated by gender and did not find that it warranted a separate table.

Turnover experience during the last five years was considered in the analysis shown on the following pages. The "Exposure" column shows the number of employees at various years of service throughout the experience period. The number of exposures excludes members that were eligible to retire with a minimum annuity formula benefit.

The "Turnover" column shows the number of employees at various years of service that have gone from active status for reasons other than retirement and death. This includes members moving to inactive status and members terminating and receiving a refund of contributions.

In this plan, there is considerable movement between active and inactive status. Typically, we would consider a status change from active to inactive a termination in developing turnover rates. However, because many of these participants return to active status and accrue additional benefits, we have considered this in our analysis of turnover experience.

There were fewer terminations than expected under the current assumptions. Based on our analysis, we recommend maintaining service-based rates and making the following changes to the turnover rates:

- Increase the rate of turnover during the first year of service and decrease rates for service of three or more years to recognize actual experience and the impact of inactive members returning to active status and accruing additional future benefits; and
- Maintain a pattern of termination rates that grade down to an ultimate rate of 1.0 percent until a member is eligibility for retirement.

The table and graph on the following pages show termination experience by service.

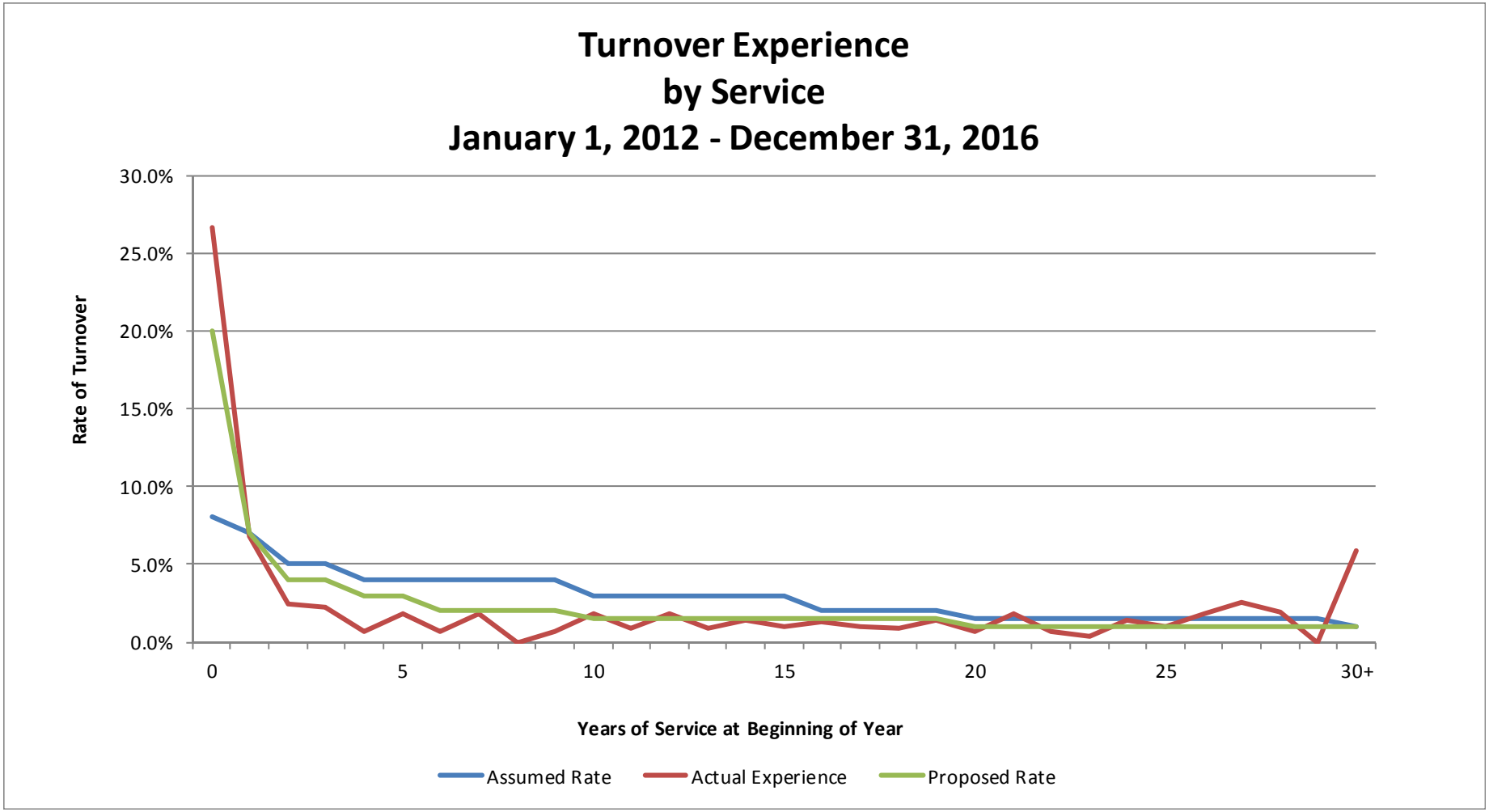
- Table and Graph IV – Termination Experience by Service

Table IV

Turnover Experience by Service									
	Actual Experience			Current Assumptions			Proposed Assumptions		
Service BOY	Exposures	Turnover	Actual Rate	Expected Turnover	Assumed Rate	Actual / Expected	Expected Turnover	Proposed Rate	Actual / Expected
0	154	41	26.62%	12	8.00%	3.3	31	20.00%	1.3
1	680	46	6.76%	48	7.00%	1.0	48	7.00%	1.0
2	499	12	2.40%	25	5.00%	0.5	20	4.00%	0.6
3	361	8	2.22%	18	5.00%	0.4	14	4.00%	0.6
4	282	2	0.71%	11	4.00%	0.2	8	3.00%	0.2
5	169	3	1.78%	7	4.00%	0.4	5	3.00%	0.6
6	281	2	0.71%	11	4.00%	0.2	6	2.00%	0.4
7	280	5	1.79%	11	4.00%	0.4	6	2.00%	0.9
8	321	0	0.00%	13	4.00%	0.0	6	2.00%	0.0
9	309	2	0.65%	12	4.00%	0.2	6	2.00%	0.3
10	324	6	1.85%	10	3.00%	0.6	5	1.50%	1.2
11	323	3	0.93%	10	3.00%	0.3	5	1.50%	0.6
12	562	10	1.78%	17	3.00%	0.6	8	1.50%	1.2
13	674	6	0.89%	20	3.00%	0.3	10	1.50%	0.6
14	730	10	1.37%	22	3.00%	0.5	11	1.50%	0.9
15	814	8	0.98%	24	3.00%	0.3	12	1.50%	0.7
16	710	9	1.27%	14	2.00%	0.6	11	1.50%	0.8
17	605	6	0.99%	12	2.00%	0.5	9	1.50%	0.7
18	551	5	0.91%	11	2.00%	0.5	8	1.50%	0.6
19	430	6	1.40%	9	2.00%	0.7	6	1.50%	0.9
20	317	2	0.63%	5	1.50%	0.4	3	1.00%	0.6
21	332	6	1.81%	5	1.50%	1.2	3	1.00%	1.8
22	306	2	0.65%	5	1.50%	0.4	3	1.00%	0.7
23	241	1	0.41%	4	1.50%	0.3	2	1.00%	0.4
24	215	3	1.40%	3	1.50%	0.9	2	1.00%	1.4
25	206	2	0.97%	3	1.50%	0.6	2	1.00%	1.0
26	161	3	1.86%	2	1.50%	1.2	2	1.00%	1.9
27	120	3	2.50%	2	1.50%	1.7	1	1.00%	2.5
28	103	2	1.94%	2	1.50%	1.3	1	1.00%	1.9
29	32	0	0.00%	0	1.50%	0.0	0	1.00%	0.0
30+	17	1	5.88%	0	1.00%	5.9	0	1.00%	5.9
Total	**11,109**	**215**	**1.94%**	**348**	**3.13%**	**0.6**	**256**	**2.31%**	**0.8**

	Actual	Proposed
Current	1.94%	2.31%
Previous Experience Review Results		
2004-2011	3.73%	3.28%

Graph IV


Turnover Experience
by Service
January 1, 2012 - December 31, 2016
Rate of Turnover
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
0
5
10
15
20
25
30+
Years of Service at Beginning of Year
Assumed Rate
Actual Experience
Proposed Rate

Disability

We recommend continuing to value disability as a term cost only. When reviewing the disability experience, a majority of the disabilities were short-term in nature. We feel that it is appropriate to continue considering these members as active members and load the normal cost to reflect the near-term cash flow. We recommend reviewing the data periodically to ensure that the assumption remains reasonable.

We recommend increasing the term cost assumption for disability from 2.50 to 3.00 percent of payroll.

The following table shows a history of annual disability payments as a percent of total payroll over the last five years.

Disability Experience					
Year Ending 12/31	Ordinary Disability Payments	Duty Disability Payments	Total Disability Payments	Valuation Payroll	Disability Payments as a % of Payroll
2016	$ 2,628,153	$ 3,727,330	$ 6,355,483	$ 208,154,918	3.05%
2015	2,596,981	3,784,809	6,381,790	204,772,903	3.12%
2014	2,382,508	3,221,962	5,604,470	202,673,014	2.77%
2013	2,451,663	3,183,319	5,634,983	200,351,820	2.81%
2012	2,579,003	3,243,431	5,822,435	198,789,741	2.93%
All Years	**12,638,309**	**17,160,850**	**29,799,161**	**1,014,742,396**	**2.94%**

SECTION D

COST IMPACT

Cost Impact

The impact of adopting the recommended assumptions is summarized in the table below and on the following pages. The results are based on the December 31, 2016, valuation and include the funding policy and benefit changes provided under PA 100-0023.

	Actuarial Accrued Liability (AAL) As of December 31, 2016				Normal Cost As of December 31, 2016			
	Current Assumptions	Recommended Assumption Changes Excluding Investment Return	% Change	Recommended Assumption Changes Inc. 7.00% Investment Return	% Change	Current Assumptions	Recommended Assumption Changes Excluding Investment Return	% Change	Recommended Assumption Changes Inc. 7.00% Investment Return	% Change
(1) Values for Active Members										
(a) Retirement	$ 868,617,829	$ 798,727,257	(8.0)%	$ 863,421,770	(0.6)%	$ 23,927,682	$ 23,248,097	(2.8)%	$ 26,638,443	11.3%
(b) Termination	7,887,046	4,814,496	(39.0)%	5,631,787	(28.6)%	5,052,957	3,455,971	(31.6)%	3,726,759	(26.2)%
(c) Death	9,572,718	12,341,286	28.9%	13,165,564	37.5%	672,440	776,096	15.4%	856,483	27.4%
(d) Inactive Vested and Non-Vested	27,973,776	28,335,260	1.3%	29,780,137	6.5%	-	-		-	
(e) Disability	-	-		-		5,203,873	6,244,648	20.0%	6,244,648	20.0%
(f) Expense of Administration	-	-		-		4,053,392	4,023,877	(0.7)%	4,033,268	(0.5)%
Total for Actives and Inactives	**$ 914,051,369**	**$ 844,218,299**	**(7.6)%**	**$ 911,999,258**	**(0.2)%**	**$ 38,910,344**	**$ 37,748,688**	**(3.0)%**	**$ 41,499,600**	**6.7%**
(2) Values for Members in Payment Status	**$ 1,595,221,142**	**$ 1,638,832,143**	**2.7%**	**$ 1,711,271,552**	**7.3%**					
(3) Grand Totals	**$ 2,509,272,511**	**$ 2,483,050,442**	**-1.0%**	**$ 2,623,270,810**	**4.5%**					
(4) Unfunded Actuarial Accrued Liability	**$ 1,245,607,640**	**$ 1,219,385,571**	**-2.1%**	**$ 1,359,605,939**	**9.2%**					
(5) Funded Ratio	**50.36%**	**50.89%**	**1.1%**	**48.17%**	**(2.2)%**					
(6) City Contribution for Payment Year 2023	**$ 123,100,077**	**$ 128,138,373**	**4.1%**	**$ 135,851,374**	**10.4%**					
(7) Actuarially Determined Contribution	**$ 124,226,042**	**$ 120,941,148**	**-2.6%**	**$ 141,358,108**	**13.8%**					

Cost Impact

The impact of adopting the recommended assumptions with an alternative investment return assumption of 7.25 percent is summarized in the table below and on the following pages. The results are based on the December 31, 2016, valuation and include the funding policy and benefit changes provided under PA 100-0023.

	Actuarial Accrued Liability (AAL) As of December 31, 2016			Normal Cost As of December 31, 2016		
	Current Assumptions	7.25% IR/DR Sensitivity Assumptions	% Change	Current Assumptions	7.25% IR/DR Sensitivity Assumptions	% Change
(1) Values for Active Members						
(a) Retirement	$ 868,617,829	$ 830,256,118	(4.4)%	$ 23,927,682	$ 24,880,825	4.0%
(b) Termination	7,887,046	5,218,463	(33.8)%	5,052,957	3,585,744	(29.0)%
(c) Death	9,572,718	12,744,642	33.1%	672,440	815,067	21.2%
(d) Inactive Vested and Non-Vested	27,973,776	29,033,086	3.8%	-	-	
(e) Disability	-	-		5,203,873	6,244,648	20.0%
(f) Expense of Administration	-	-		4,053,392	4,028,564	(0.6)%
Total for Actives and Inactives	**$ 914,051,369**	**$ 877,252,309**	**(4.0)%**	**$ 38,910,344**	**$ 39,554,848**	**1.7%**
(2) Values for Members in Payment Status	**$ 1,595,221,142**	**$ 1,674,340,001**	**5.0%**			
(3) Grand Totals	**$ 2,509,272,511**	**$ 2,551,592,310**	**1.7%**			
(4) Unfunded Actuarial Accrued Liability	**$ 1,245,607,640**	**$ 1,287,927,439**	**3.4%**			
(5) Funded Ratio	**50.36%**	**49.52%**	**(0.8)%**			
(6) City Contribution for Payment Year 2023	**$ 123,100,077**	**$ 131,985,164**	**7.2%**			
(7) Actuarially Determined Contribution	**$ 124,226,042**	**$ 130,729,803**	**5.2%**			

Cost Impact

Recommended Assumptions

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago
Actuarial Valuation Projection Results as of December 31, 2016 — Recommended Assumptions (7.00% Investment Return Assumption)
Based on the Provisions Contained in PA 100-0023
($ in Thousands)

PYE 12/31	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Liability	Funded Ratio	Capped Payroll	Total Statutory Contribution	Statutory Contribution % of Pay	Total Normal Cost	Total Employee Contribution	Applicable Employee Contribution	Benefits	Administrative Expenses
2016	$ 2,623,271	$ 1,263,665	$ 1,359,606	48.17%	$ 208,155	$ 14,443	6.94%	$ 38,516	$ 17,246	$ 15,608	$ 156,523	$ 4,080
2017	2,681,386	1,190,125	1,491,261	44.38%	211,283	14,418	6.82%	41,500	17,957	16,592	160,094	4,172
2018	2,738,232	1,108,089	1,630,143	40.47%	215,694	36,000	16.69%	41,876	18,493	17,088	165,549	4,266
2019	2,794,270	1,041,199	1,753,071	37.26%	220,348	48,000	21.78%	42,366	19,133	17,679	170,589	4,362
2020	2,848,597	1,003,108	1,845,489	35.21%	225,031	60,000	26.66%	42,826	19,827	18,320	176,411	4,460
2021	2,900,891	975,616	1,925,275	33.63%	230,139	72,000	31.29%	43,321	20,567	19,004	182,466	4,560
2022	2,951,144	953,133	1,998,011	32.30%	235,594	84,000	35.65%	43,875	21,355	19,732	188,448	4,663
2023	2,999,045	977,128	2,021,917	32.58%	241,057	135,851	56.36%	44,412	22,186	20,500	194,573	4,768
2024	3,044,101	999,417	2,044,684	32.83%	246,861	138,255	56.01%	44,939	23,046	21,295	201,002	4,875
2025	3,085,864	1,019,835	2,066,029	33.05%	253,091	140,852	55.65%	45,517	23,964	22,143	207,724	4,985
2026	3,123,798	1,037,980	2,085,818	33.23%	259,386	143,431	55.30%	46,099	24,934	23,039	214,741	5,097
2027	3,158,280	1,054,461	2,103,819	33.39%	265,939	146,105	54.94%	46,684	25,934	23,963	221,135	5,212
2028	3,188,409	1,068,574	2,119,835	33.51%	272,637	148,824	54.59%	47,278	26,966	24,917	228,175	5,329
2029	3,213,931	1,080,158	2,133,773	33.61%	279,240	151,462	54.24%	47,858	28,021	25,891	235,148	5,449
2030	3,234,536	1,089,079	2,145,457	33.67%	285,908	154,125	53.91%	48,433	29,075	26,866	242,100	5,571
2031	3,250,623	1,096,096	2,154,527	33.72%	292,992	157,048	53.60%	49,075	30,133	27,843	248,401	5,697
2032	3,262,377	1,101,470	2,160,907	33.76%	299,859	159,841	53.31%	49,706	31,209	28,837	254,203	5,825
2033	3,269,676	1,105,233	2,164,443	33.80%	306,648	162,591	53.02%	50,313	32,266	29,814	259,801	5,956
2034	3,273,098	1,108,296	2,164,802	33.86%	313,722	165,548	52.77%	50,974	33,304	30,773	264,594	6,090
2035	3,273,428	1,111,762	2,161,666	33.96%	320,995	168,661	52.54%	51,699	34,344	31,734	268,427	6,227
2036	3,271,173	1,116,314	2,154,859	34.13%	328,125	171,709	52.33%	52,420	35,378	32,690	271,554	6,367
2037	3,266,872	1,122,825	2,144,047	34.37%	335,420	174,888	52.14%	53,172	36,390	33,624	274,015	6,511
2038	3,260,847	1,131,802	2,129,045	34.71%	342,510	177,945	51.95%	53,892	37,394	34,552	275,987	6,657
2039	3,253,314	1,143,590	2,109,724	35.15%	349,265	180,839	51.78%	54,590	38,383	35,466	277,611	6,807
2040	3,245,161	1,159,387	2,085,774	35.73%	356,041	183,821	51.63%	55,314	39,319	36,331	278,296	6,960
2041	3,237,505	1,180,648	2,056,857	36.47%	362,844	186,892	51.51%	56,086	40,226	37,169	277,906	7,117
2042	3,231,056	1,208,341	2,022,715	37.40%	369,464	189,891	51.40%	56,850	41,112	37,987	276,851	7,277
2043	3,226,354	1,243,367	1,982,987	38.54%	376,076	192,913	51.30%	57,617	41,974	38,784	275,355	7,440
2044	3,223,970	1,286,698	1,937,272	39.91%	382,704	195,958	51.20%	58,388	42,824	39,570	273,426	7,608
2045	3,223,954	1,338,702	1,885,252	41.52%	389,129	198,867	51.11%	59,117	43,673	40,354	271,559	7,779
2046	3,226,705	1,400,412	1,826,293	43.40%	395,948	202,028	51.02%	59,906	44,516	41,132	269,523	7,954
2047	3,232,739	1,472,798	1,759,941	45.56%	402,706	205,172	50.95%	60,728	45,378	41,929	267,208	8,133
2048	3,242,307	1,556,661	1,685,646	48.01%	409,536	208,376	50.88%	61,576	46,242	42,727	264,894	8,316
2049	3,255,754	1,652,950	1,602,804	50.77%	416,458	211,650	50.82%	62,453	47,108	43,527	262,511	8,503
2050	3,273,039	1,762,240	1,510,799	53.84%	423,426	214,944	50.76%	63,336	47,981	44,334	260,433	8,694
2051	3,293,532	1,884,527	1,409,005	57.22%	430,356	218,206	50.70%	64,226	48,875	45,160	259,225	8,890
2052	3,316,900	2,020,298	1,296,602	60.91%	437,575	221,680	50.66%	65,223	49,801	46,016	258,666	9,090
2053	3,343,051	2,170,190	1,172,861	64.92%	444,766	225,144	50.62%	66,241	50,745	46,888	258,405	9,295
2054	3,371,887	2,334,987	1,036,900	69.25%	452,138	228,744	50.59%	67,314	51,693	47,764	258,478	9,504
2055	3,403,320	2,515,511	887,809	73.91%	459,630	232,415	50.57%	68,405	52,644	48,643	258,835	9,718
2056	3,437,713	2,713,161	724,552	78.92%	467,364	236,265	50.55%	69,561	53,597	49,523	259,078	9,936
2057	3,475,119	2,928,994	546,125	84.28%	475,118	240,076	50.53%	70,653	54,532	50,388	259,398	10,160
2058	3,515,127	3,163,730	351,397	90.00%	483,016	244,021	50.52%	71,794	55,450	51,236	260,365	10,388

Cost Impact

Sensitivity Assumptions

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago
Actuarial Valuation Projection Results as of December 31, 2016 — Sensitivity Assumptions (7.25% Investment Return Assumption)
Based on the Provisions Contained in PA 100-0023
($ in Thousands)

PYE 12/31	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Liability	Funded Ratio	Capped Payroll	Total Statutory Contribution	Statutory Contribution % of Pay	Total Normal Cost	Total Employee Contribution	Applicable Employee Contribution	Benefits	Administrative Expenses
2016	$ 2,551,592	$ 1,263,665	$ 1,287,927	49.52%	$ 208,155	$ 14,443	6.94%	$ 38,516	$ 17,246	$ 15,608	$ 156,523	$ 4,080
2017	2,608,849	1,192,846	1,416,003	45.72%	211,283	14,418	6.82%	39,555	17,957	16,592	160,132	4,172
2018	2,664,909	1,113,610	1,551,299	41.79%	215,694	36,000	16.69%	39,926	18,493	17,088	165,587	4,266
2019	2,720,227	1,049,629	1,670,598	38.59%	220,348	48,000	21.78%	40,406	19,133	17,679	170,628	4,362
2020	2,773,911	1,014,574	1,759,337	36.58%	225,031	60,000	26.66%	40,860	19,827	18,320	176,451	4,460
2021	2,825,636	990,264	1,835,372	35.05%	230,139	72,000	31.29%	41,348	20,567	19,004	182,507	4,560
2022	2,875,392	971,134	1,904,258	33.77%	235,594	84,000	35.65%	41,892	21,355	19,732	188,490	4,663
2023	2,922,869	994,718	1,928,151	34.03%	241,057	131,985	54.75%	42,420	22,186	20,500	194,616	4,768
2024	2,967,577	1,016,569	1,951,008	34.26%	246,861	134,337	54.42%	42,941	23,046	21,295	201,045	4,875
2025	3,009,063	1,036,511	1,972,552	34.45%	253,091	136,879	54.08%	43,513	23,964	22,143	207,769	4,985
2026	3,046,791	1,054,134	1,992,657	34.60%	259,386	139,403	53.74%	44,090	24,934	23,039	214,787	5,097
2027	3,081,142	1,070,046	2,011,096	34.73%	265,939	142,022	53.40%	44,670	25,934	23,963	221,175	5,212
2028	3,111,206	1,083,529	2,027,677	34.83%	272,637	144,687	53.07%	45,262	26,966	24,917	228,216	5,329
2029	3,136,722	1,094,411	2,042,311	34.89%	279,240	147,271	52.74%	45,840	28,021	25,891	235,190	5,449
2030	3,157,376	1,102,549	2,054,827	34.92%	285,908	149,883	52.42%	46,415	29,075	26,866	242,144	5,571
2031	3,173,554	1,108,681	2,064,873	34.93%	292,992	152,746	52.13%	47,052	30,133	27,843	248,447	5,697
2032	3,185,433	1,113,060	2,072,373	34.94%	299,859	155,480	51.85%	47,678	31,209	28,837	254,251	5,825
2033	3,192,885	1,115,706	2,077,179	34.94%	306,648	158,173	51.58%	48,281	32,266	29,814	259,850	5,956
2034	3,196,473	1,117,511	2,078,962	34.96%	313,722	161,068	51.34%	48,934	33,304	30,773	264,645	6,090
2035	3,196,968	1,119,560	2,077,408	35.02%	320,995	164,110	51.13%	49,645	34,344	31,734	268,483	6,227
2036	3,194,871	1,122,525	2,072,346	35.14%	328,125	167,088	50.92%	50,352	35,378	32,690	271,613	6,367
2037	3,190,705	1,127,265	2,063,440	35.33%	335,420	170,193	50.74%	51,086	36,390	33,624	274,080	6,511
2038	3,184,793	1,134,282	2,050,511	35.62%	342,510	173,181	50.56%	51,792	37,394	34,552	276,059	6,657
2039	3,177,347	1,143,919	2,033,428	36.00%	349,265	176,006	50.39%	52,475	38,383	35,466	277,684	6,807
2040	3,169,247	1,157,369	2,011,878	36.52%	356,041	178,919	50.25%	53,182	39,319	36,331	278,373	6,960
2041	3,161,600	1,176,073	1,985,527	37.20%	362,844	181,913	50.14%	53,930	40,226	37,169	277,986	7,117
2042	3,155,118	1,201,003	1,954,115	38.07%	369,464	184,838	50.03%	54,671	41,112	37,987	276,933	7,277
2043	3,150,337	1,233,058	1,917,279	39.14%	376,076	187,783	49.93%	55,413	41,974	38,784	275,442	7,440
2044	3,147,831	1,273,214	1,874,617	40.45%	382,704	190,752	49.84%	56,160	42,824	39,570	273,516	7,608
2045	3,147,655	1,321,850	1,825,805	41.99%	389,129	193,590	49.75%	56,867	43,673	40,354	271,653	7,779
2046	3,150,209	1,380,002	1,770,207	43.81%	395,948	196,674	49.67%	57,632	44,516	41,132	269,622	7,954
2047	3,156,010	1,448,647	1,707,363	45.90%	402,706	199,740	49.60%	58,429	45,378	41,929	267,311	8,133
2048	3,165,314	1,528,599	1,636,715	48.29%	409,536	202,864	49.54%	59,250	46,242	42,727	265,002	8,316
2049	3,178,470	1,620,818	1,557,652	50.99%	416,458	206,057	49.48%	60,100	47,108	43,527	262,626	8,503
2050	3,195,443	1,725,898	1,469,545	54.01%	423,426	209,269	49.42%	60,955	47,981	44,334	260,557	8,694
2051	3,215,612	1,843,859	1,371,753	57.34%	430,356	212,453	49.37%	61,821	48,875	45,160	259,359	8,890
2052	3,238,642	1,975,200	1,263,442	60.99%	437,575	215,843	49.33%	62,790	49,801	46,016	258,812	9,090
2053	3,264,447	2,120,584	1,143,863	64.96%	444,766	219,222	49.29%	63,779	50,745	46,888	258,565	9,295
2054	3,292,929	2,280,816	1,012,113	69.26%	452,138	222,734	49.26%	64,821	51,693	47,764	258,657	9,504
2055	3,324,000	2,456,747	867,253	73.91%	459,630	226,316	49.24%	65,881	52,644	48,643	259,035	9,718
2056	3,358,020	2,649,801	708,219	78.91%	467,364	230,071	49.23%	67,003	53,597	49,523	259,305	9,936
2057	3,395,047	2,861,075	533,972	84.27%	475,118	233,788	49.21%	68,062	54,532	50,388	259,656	10,160
2058	3,434,668	3,091,326	343,342	90.00%	483,016	237,639	49.20%	69,169	55,450	51,236	260,662	10,388

Cost Impact

Baseline Assumptions

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago
Actuarial Valuation Projection Results as of December 31, 2016 — Baseline Assumptions
Based on the Provisions Contained in PA 100-0023
($ in Thousands)

PYE 12/31	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Liability	Funded Ratio	Capped Payroll	Total Statutory Contribution	Statutory Contribution % of Pay	Total Normal Cost	Total Employee Contribution	Applicable Employee Contribution	Benefits	Administrative Expenses
2016	$ 2,509,273	$ 1,263,665	$ 1,245,608	50.36%	$ 208,155	$ 14,443	6.94%	$ 38,516	$ 17,246	$ 15,608	$ 156,523	$ 4,080
2017	2,568,444	1,195,176	1,373,268	46.53%	211,687	14,418	6.81%	38,910	18,022	16,652	160,581	4,203
2018	2,623,632	1,115,809	1,507,823	42.53%	216,735	36,000	16.61%	38,974	18,762	17,336	168,645	4,329
2019	2,675,641	1,049,475	1,626,166	39.22%	222,358	48,000	21.59%	39,303	19,616	18,125	175,915	4,459
2020	2,724,017	1,010,237	1,713,780	37.09%	228,383	60,000	26.27%	39,701	20,544	18,982	183,458	4,592
2021	2,768,882	980,406	1,788,476	35.41%	235,220	72,000	30.61%	40,131	21,535	19,899	190,653	4,730
2022	2,810,349	954,539	1,855,810	33.97%	242,653	84,000	34.62%	40,681	22,608	20,890	197,603	4,872
2023	2,848,183	961,022	1,887,161	33.74%	250,322	123,100	49.18%	41,317	23,743	21,939	204,620	5,018
2024	2,881,929	964,590	1,917,339	33.47%	258,440	125,960	48.74%	41,939	24,928	23,033	211,794	5,169
2025	2,911,220	965,152	1,946,068	33.15%	266,990	129,009	48.32%	42,618	26,162	24,174	219,081	5,324
2026	2,935,610	962,444	1,973,166	32.79%	275,720	132,136	47.92%	43,347	27,444	25,358	226,524	5,484
2027	2,956,060	957,673	1,998,387	32.40%	284,726	135,363	47.54%	44,090	28,756	26,570	232,693	5,648
2028	2,971,775	950,252	2,021,523	31.98%	293,891	138,653	47.18%	44,855	30,095	27,808	239,363	5,817
2029	2,982,673	940,154	2,042,519	31.52%	302,827	141,843	46.84%	45,632	31,449	29,059	245,777	5,992
2030	2,988,706	927,504	2,061,202	31.03%	311,783	145,024	46.51%	46,368	32,780	30,289	251,841	6,172
2031	2,990,444	913,081	2,077,363	30.53%	320,829	148,307	46.23%	47,142	34,085	31,494	257,038	6,357
2032	2,988,355	897,566	2,090,789	30.04%	329,928	151,671	45.97%	47,959	35,373	32,685	261,510	6,548
2033	2,982,930	881,723	2,101,207	29.56%	339,190	155,139	45.74%	48,801	36,651	33,866	265,253	6,744
2034	2,975,083	866,807	2,108,276	29.14%	348,714	158,773	45.53%	49,691	37,923	35,041	267,916	6,946
2035	2,965,539	853,575	2,111,964	28.78%	357,747	162,255	45.35%	50,634	39,191	36,213	269,755	7,155
2036	2,954,860	842,658	2,112,202	28.52%	366,353	165,575	45.20%	51,525	40,391	37,321	270,870	7,369
2037	2,943,718	834,939	2,108,779	28.36%	374,844	168,908	45.06%	52,408	41,521	38,365	271,238	7,590
2038	2,932,590	831,110	2,101,480	28.34%	383,204	172,234	44.95%	53,312	42,622	39,383	271,127	7,818
2039	2,922,010	832,045	2,089,965	28.48%	391,677	175,612	44.84%	54,204	43,708	40,386	270,485	8,053
2040	2,912,863	839,012	2,073,851	28.80%	400,303	179,114	44.74%	55,149	44,787	41,384	269,075	8,294
2041	2,906,005	853,267	2,052,738	29.36%	409,064	182,725	44.67%	56,150	45,871	42,385	266,995	8,543
2042	2,902,102	875,885	2,026,217	30.18%	417,905	186,404	44.60%	57,190	46,959	43,390	264,471	8,799
2043	2,901,760	907,934	1,993,826	31.29%	426,876	190,165	44.55%	58,263	48,053	44,401	261,602	9,063
2044	2,905,564	950,516	1,955,048	32.71%	436,031	194,032	44.50%	59,373	49,155	45,419	258,459	9,335
2045	2,913,824	1,004,458	1,909,366	34.47%	445,271	197,954	44.46%	60,521	50,277	46,456	255,346	9,615
2046	2,926,851	1,070,682	1,856,169	36.58%	454,729	201,981	44.42%	61,695	51,410	47,503	252,274	9,904
2047	2,944,897	1,150,073	1,794,824	39.05%	464,349	206,105	44.39%	62,916	52,563	48,568	249,345	10,201
2048	2,968,143	1,243,515	1,724,628	41.90%	474,179	210,329	44.36%	64,175	53,742	49,657	246,633	10,507
2049	2,996,766	1,351,943	1,644,823	45.11%	484,237	214,667	44.33%	65,475	54,944	50,768	244,162	10,822
2050	3,030,608	1,476,016	1,554,592	48.70%	494,512	219,114	44.31%	66,820	56,174	51,905	242,270	11,147
2051	3,069,041	1,615,953	1,453,088	52.65%	504,942	223,640	44.29%	68,220	57,445	53,079	241,406	11,481
2052	3,111,572	1,772,217	1,339,355	56.96%	515,635	228,297	44.27%	69,692	58,767	54,301	241,416	11,826
2053	3,157,909	1,945,494	1,212,415	61.61%	526,463	233,022	44.26%	71,193	60,108	55,540	242,023	12,180
2054	3,207,796	2,136,598	1,071,198	66.61%	537,484	237,856	44.25%	72,747	61,473	56,801	243,196	12,546
2055	3,260,872	2,346,246	914,626	71.95%	548,518	242,701	44.25%	74,311	62,844	58,068	244,974	12,922
2056	3,317,109	2,575,233	741,876	77.63%	558,798	247,206	44.24%	75,846	64,207	59,328	246,969	13,310
2057	3,376,140	2,824,194	551,946	83.65%	568,588	251,545	44.24%	77,292	65,442	60,468	249,441	13,709
2058	3,437,195	3,093,571	343,624	90.00%	578,203	255,867	44.25%	78,719	66,600	61,539	252,828	14,120

SECTION E

RECOMMENDED ACTUARIAL ASSUMPTIONS

Recommended Actuarial Assumptions to be adopted for the December 31, 2017, Valuation

Demographic Assumptions

Post-Retirement Mortality

Scaling factors of 117 percent for males, and 102 percent for females of the RP-2014 Blue Collar Healthy Annuitant mortality table, sex distinct, with generational mortality improvement using MP-2017 2-dimensional mortality improvement scales recently released by the SOA. This assumption provides a margin for mortality improvements. No adjustment is made for post-disabled mortality.

Pre-Retirement Mortality

Scaling factors of 109 percent for males, and 103 percent for females of the RP-2014 Blue Collar Employee mortality table, sex distinct, with generational mortality improvement using MP-2017 2-dimensional mortality improvement scales recently released by the SOA. This assumption provides a margin for mortality improvements.

Future mortality improvements in pre- and post-retirement mortality are reflected by projecting the base mortality tables back from the year 2014 to the year 2006 using the MP-2014 projection scale and projecting from 2006 using the MP-2017 projection scale.

We use what is termed "the limited fluctuation credibility procedure" to determine the appropriate scaling factor of the base mortality tables for each gender and each member classification. We used a benefits weighted basis for postretirement mortality and used a headcount basis for preretirement mortality. In each case, the partial credibility factor (or "Z-factor") is computed based on the experience of the specific group being studied. This Z-factor is a measure of the credibility of the pertinent group.

The Best Fit is the ratio of actual to expected deaths using the base table. The final scale is then determined as the weighted average of the Best Fit and 100 percent based on the Z-factor. For example, the Z-factor for Male Active Members is 22 percent, suggesting that the data for this group is 22 percent credible (there were not enough deaths among active members to be completely credible). The Best Fit for this group would be to scale the base tables by 142 percent. The final scale of 109 percent is the credibility-weighted average (109% = 22% x 142% + 78% x 100%). Factors for other groups are determined similarly.

	Future Life Expectancy (years) in 2016		Future Life Expectancy (years) in 2030	
	Postretirement		Postretirement	
Age	Male	Female	Male	Female
35	46.23	51.19	48.58	52.50
40	41.16	45.96	43.44	47.25
45	36.19	40.83	38.40	42.09
50	31.33	35.79	33.48	37.03
55	26.66	30.91	28.72	32.10
60	22.27	26.25	24.16	27.35
65	18.19	21.80	19.87	22.80
70	14.41	17.55	15.90	18.48
75	10.97	13.62	12.29	14.48

Recommended Actuarial Assumptions

Rate of Retirement:

Tier 1 Age-and-Service-Based Rates of Retirement

	Years of Service								
Attained Age	**10**	**11-14**	**15-19**	**20-24**	**25-29**	**30-32**	**33-34**	**35-39**	**40+**
50-54	-	-	-	-	-	17 %	28 %	25 %	100 %
55-59	-	-	-	9 %	13 %	13	22	19	100
60-64	9 %	6 %	6 %	9	13	13	22	19	100
65-69	11	11	17	17	17	17	28	25	100
70-79	17	17	17	17	17	17	28	28	100
80+	100	100	100	100	100	100	100	100	100

Tier 2 Age-and-Service-Based Rates of Retirement

	Years of Service	
Attained Age	**10-39**	**40+**
62-66	24 %	100 %
67-69	40	100
70-79	40	100
80+	100	100

Tier 3 Age-and-Service-Based Rates of Retirement

	Years of Service	
Attained Age	**10-39**	**40+**
60-64	24 %	100 %
65-69	40	100
70-79	40	100
80+	100	100

Rate of Termination:

Service	Rate
0	20.00%
1	7.00%
2-3	4.00%
4-5	3.00%
6-9	2.00%
10-19	1.50%
20+	1.00%

Disability: Liability for disability benefits is recognized as a one-year term cost or 3.00 percent of pay added to the normal cost.

Recommended Actuarial Assumptions

Economic Assumptions

Investment Return and Discount Rate: 7.00 percent per year, compounded annually, net of investment expenses. The 7.00 percent assumption is composed of a 2.25 percent inflation assumption and a 4.75 percent real rate of return assumption.

General Inflation: 2.25 percent per year, compounded annually.

This assumption serves as the basis for the determination of annual increases in pension and the pensionable salary cap for Tier Two and Tier Three members.

Wage Inflation and Payroll Growth: 3.00 percent per year, compounded annually.

Future Salary Increases: The assumed base rate of individual salary increase is 3.00 percent per year (underlying wage inflation assumption), plus a service-based increase in the first ten years.

Completed Years of Service[1]	Additional Increase	Total Increase
1	12.00 %	15.00 %
2	9.50	12.50
3	7.00	10.00
4 – 6	2.00	5.00
7	3.00	6.00
8	1.00	4.00
9	0.20	3.20
10 – 30+	0.00	3.00

[1] *Based on projected service at end of valuation year.*

Asset Value: The Actuarial Value of Assets is smoothed by using a five-year phase-in of each year's unexpected investment gains and losses.

Expenses: Administrative expenses included in the normal cost are based on the previous years' administrative expenses increased by 2.25 percent and discounted to the beginning of the year. Future administrative expenses are assumed to increase at the assumed inflation assumption of 2.25 percent.

Other Assumptions and Provisions

Marital Status: It is assumed that 75 percent of active members have an eligible spouse. The male spouse is assumed to be three years older than the female spouse. No assumption is made about other dependents.

Reciprocal Service: No assumption for reciprocal service.

Benefit Service: Exact fractional years of service are used to determine the amount of benefit payable.

Recommended Actuarial Assumptions

Decrement Timing: All decrements are assumed to occur mid-year.

Decrement Relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

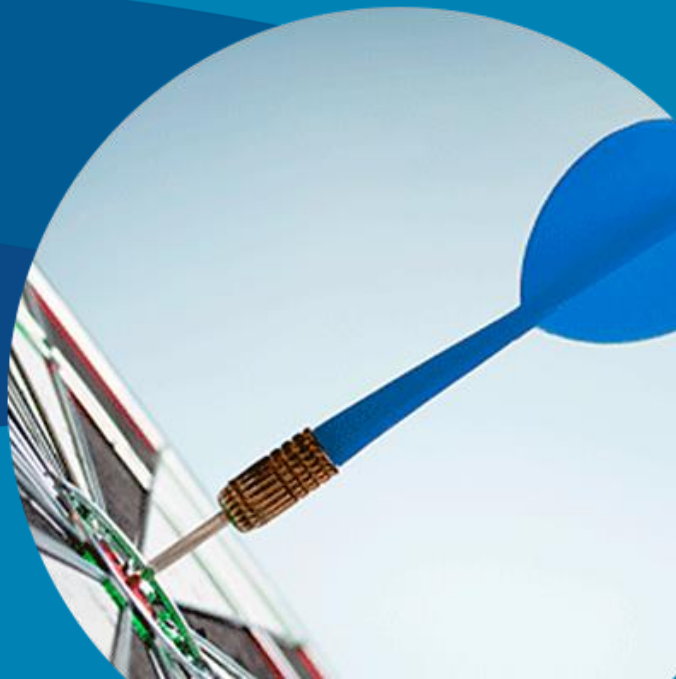
Decrement Operation: Turnover decrements do not operate after member reaches retirement eligibility for a minimum annuity formula benefit.

Eligibility Testing: Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

Pay Increase Timing: Middle of the (fiscal) year.

Laborers' and Retirement Board Employees' Annuity and Benefit Fund of Chicago

Experience Review
Covering the Period
January 1, 2012, to December 31, 2016



Purpose of the Experience Study

- Review demographic and economic experience and update assumptions used for the December 31, 2017, actuarial valuation
- Demographic study includes:
  - Comparing expected rates of retirement, termination and mortality against actual rates over a five-year experience period from 2012 through 2016
- Economic study includes:
  - Comparing expected pay increases over actual pay increases during the five-year experience period
  - Reviewing general inflation and wage inflation trends and long-term expectations
  - Reviewing the Fund's target asset allocation and projecting the expected long-term return using capital market assumptions from a sample of 10 national investment consulting firms
- Recommendations follow Actuarial Standards of Practice
  - ASOP 4, ASOP 27, ASOP 35 and ASOP 44

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Recommended Assumptions

- Based on our study, we recommend:
  - Decreasing retirement rates
  - Updating the mortality tables based on the RP-2014 Blue Collar tables with generational mortality improvements
  - Decreasing termination rates
  - Increasing disability term cost rate
  - Decreasing salary increase rates
  - Decreasing general inflation assumption from 3.00% to 2.25%
  - Decreasing wage inflation assumption from 3.75% to 3.00%
  - Decreasing nominal investment return assumption from 7.50% to 7.00%
  - Increasing real investment return from 4.50% to 4.75%

Recommended Assumptions – Retirement Rates

- Recommend decreasing retirement rates
- Retirement rates are based on age and service at retirement
- The following table compares expected retirement age and expected number of retirements on an aggregate basis:

	Current Assumptions	Observed Experience	Recommended Assumptions
Average retirement age	59.5	60.0	60.3
Expected number of retirements	765	446	500

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Recommended Assumptions – Mortality Rates – Retirees

- Recommend updating postretirement mortality rates using the RP-2014 Blue Collar Annuitant Table with generational mortality improvements as the baseline table
  - Baseline annuitant mortality rates were increased by 117% for males and 102% for females to partially recognize observed aggregate experience
- The following table compares aggregate expected deaths on a benefit-weighted basis ($ in 100,000)

Annuitant	Current Table RP - 2000	Observed Experience	Baseline Table RP-2014 BC	Baseline Table with Scaling (117% M 102% F)
Male	$194	$208	$163	$189
Female	$15	$20	$19	$19

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Recommended Assumptions – Mortality Rates – Active Members

- Recommend updating active member mortality rates using the RP-2014 Blue Collar Employee Table with generational mortality improvements as the baseline table
  - Baseline employee mortality rates were increased by 109% for males and 103% for females to partially recognized observed aggregate experience
- The following table compares aggregate expected deaths on a headcount-weighted basis

Employee	Current Table RP - 2000	Observed Experience	Baseline Table RP-2014 BC	Baseline Table with Scaling (109% M 103% F)
Male	35	52	37	40
Female	4	5	4	4

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Recommended Assumptions – Termination Rates

- Recommend decreasing termination rates
- Select and ultimate termination rates are based on service at termination
  - 7.0% with one year of service grading down to 1.0% with 20 or more years of service
- The following table compares expected number of terminations on an aggregate basis:

	Current Assumptions	Observed Experience	Recommended Assumptions
Expected number of terminations	348	215	256

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Recommended Assumptions – Disability Term Cost

- Disability costs are developed on a term costs basis
  - Expected short-term disability costs expressed a percentage of payroll
  - One-year short-term cost is added to normal cost
- Recommend increasing the term cost rate
- The following table compares term cost rate on an aggregate basis:

	Current Assumptions	Observed Experience	Recommended Assumptions
Disability term cost as a percentage of payroll	2.50%	2.94%	3.00%

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Recommended Assumptions – General Inflation

- Recommend reducing inflation assumption from 3.00% to 2.25%
- Based on review of historical CPI-U increases, Federal Reserve Bank of Cleveland Inflation Forecasts and survey of investment consultant's data

Period Ending December 2017	CPI-U Historical Average Increase
5-year	1.43%
10- year	1.61%
20-year	2.14%
30-year	2.56%

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Recommended Assumptions – General Inflation

- Federal Reserve Bank of Cleveland Inflation Forecasts

Period	Jan 2015	Jan 2016	Jan 2017	Jan 2018	Feb 2018
5-year	1.50%	1.70%	1.85%	1.83%	2.00%
10-year	1.69%	1.85%	1.92%	1.92%	2.07%
20-year	1.94%	2.06%	2.09%	2.09%	2.20%
30-year	2.10%	2.19%	2.22%	2.21%	2.31%

- Investment consultant data
  - Based on a GRS survey of four national investment consulting firms, the average inflation assumption for a 20- to 30-year period was approximately 2.21%
  - Based of Horizon Actuarial Service's survey of 12 investment advisors, the average inflation assumption over a 20-year period was approximately 2.44%

Recommended Assumptions – Wage Inflation

- Wage inflation based on general inflation plus productivity increases
  - The Social Security Average Wage Index ("AWI") over the Consumer Price Index ("CPI-U") is used as proxy for national productivity

Period	AWI	CPI-U	Productivity
5-year	2.51%	1.36%	1.15%
10-year	2.33%	1.81%	0.52%
20-year	3.20%	2.12%	1.08%
30-year	3.50%	2.64%	0.86%

- LABF's average salary increase rate over the past 10 years was 2.08% which compares with national average of 2.33%
- Recommend maintaining 0.75% productivity assumption
  - With 2.25% general inflation assumption yields a wage inflation assumption of 3.00%

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Recommended Assumptions – Salary Increase

- Recommend select and ultimate salary increases based on service
  - 15% annual increase at first year of service grading down to 3.0% on and after tenth year of service
- The following table compares annual salary increases under current assumptions, observed experience and recommended assumptions on an aggregate basis

Salary Increase Components	Current Assumptions	Observed Experience	Recommended Assumptions
Price Inflation	3.00%	1.36%	2.25%
Productivity	0.75%	1.14%	0.75%
Seniority/Merit/ Promotion	0.50%	0.79%	0.75%
Total	4.25%	3.29%	3.75%

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Recommended Assumptions – Investment Return

- The investment return assumption recommendation was based on:
  - The Fund's target asset allocation
  - A projection of Fund's assets over the next 10 years and alternatively 20 years
  - Capital market assumptions from a sample of 10 national investment consulting firms
- The projections produced the following average results:

Investment Horizon	10 Years	20 to 30 Years
Likelihood of earning at least:		
- 7.00% per year	45%	51%
- 7.25% per year	42%	48%
- 7.50% per year	40%	44%

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Impact of Recommended Assumptions

- The following recommended assumption changes in general **decreased** plan cost
  - Retirement rates
  - Salary increase rates
  - General inflation
  - Wage inflation
- The following recommended assumption changes in general **increased** plan cost
  - Mortality rates
  - Termination rates
  - Disability term costs
  - Investment return

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PA 100-0023

- The cost impact due to change in assumptions recognizes the provisions of PA 100-0023
  - Actuarial cost method changed from Projected Unit Credit to Entry Age Normal
  - City's contributions
    - Fixed from 2018 to 2022
    - On and after 2023, based on level percent of pay needed to generate 90% funded ratio at 2058
  - Defines new tier 3 benefit structure for members hired on or after July 6, 2017
    - Unreduced minimum formula at age 65 with 10 years of service
    - Reduced early retirement minimum formula at age 60 with 10 years of service
    - COLA starts January 1st at later of age 65 or one year anniversary of annuity start date
    - Member contributes 11.5% of pay

Cost Impact

($ in Millions)	12/31/2016 Actuarial Liability	PY 2017 Normal Cost	PY 2023 Statutory Contribution
Baseline Assumptions (with PA 100-0023)	**$2,509**	**$38.9**	**$123.1**
Impact of Change in Assumptions (excluding Investment Return)	(26)	(1.2)	5.0
Impact of Recommended 7.00% Investment Return Assumption	140	3.8	7.8
Recommended Assumptions	**$2,623**	**$41.5**	**$135.9**

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Summary

- The recommended changes in economic assumptions due to revised expectations for future real investment returns and inflation have a more significant impact on the cost of the plan compared to the changes in demographic assumptions
- We have made our recommendations for assumption changes in accordance with the Actuarial Standards of Practice, recommending assumptions that reflect a best estimate for future experience

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Disclaimers

- This presentation is intended to be used in conjunction with the experience review report issued on March 2, 2018. This presentation should not be relied on for any purpose other than the purpose described in the actuarial valuation report.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.
- The actuary submitting this presentation (Alex Rivera) is a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.
- The purpose of the experience study is to compare actual experience against the current actuarial assumptions and recommend changes to current actuarial assumptions, as needed, for implementation in a future actuarial valuation.

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