



Howard County Police and Fire Employees' Retirement Plan Experience and Assumption Study

September 20, 2018

Bolton

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Retirement Plan Committee
Howard County Police and Fire Employees' Retirement Plan
3430 Court House Drive
Ellicott City, MD 21043

Dear Committee Members,

We have been asked by the Retirement Plan Committee to prepare an experience study. This report presents our recommended changes in assumptions due to our study of the demographic and economic experience of the Howard County Police and Fire Employees' Retirement Plan for the period June 1, 2013 through June 30, 2017, and our expectations of future experience. We summarize our recommendations in the Summary section and discuss our finding and analysis in the Demographic and Economic Assumptions sections. Finally, we discuss the effect of the proposed changes on the results of our July 1, 2017 valuation in the Impact of Changes section.

Two key assumptions are the discount rate (investment return) and the mortality table. For the discount rate we have shown the result both at the current 7.5% assumption and at 7.25%. While we prefer 7.25%, both are acceptable. For the mortality assumption we are recommending a change from the current RP-2000 AA table to RP-2014 MP2017 table. The mortality table is discussed in more detail below.

In terms of the impact of the County's cost, we provide some detail in the table at the end of the report. The Actuarially Determined Contribution (ADC) increases by \$920,452 (or 1.1% of covered payroll) if the discount rate remains at 7.5% and by \$4,143,788 (or 4.9% of covered payroll) if the discount rate drops to 7.25%. Please keep in mind:

- These numbers are all based on the 2017 valuation as 2018 results are not yet available.
- The County might also wish to phase in some of the assumption changes.

Please call if you have any questions.

Respectfully submitted,

Thomas B. Lowman, FSA, EA, MAAA

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Section I. Introduction

This report reviews the experience of the Howard County Police and Fire Employees' Retirement Plan (the "Plan") over the period July 1, 2013 through June 30, 2017 in order to determine potential changes in actuarial valuation assumptions. It is our understanding that the Retirement Plan Committee is responsible for recommending "the mortality and other tables and interest rates to be used" for the Plan. The study has been prepared to help the Committee make such recommendations.

For many assumptions, the experience of Police Officers and Firefighters are shown separately.

Section VI of the report shows the cost impact of proposed changes to the County's FYE 2019 annual contribution. Actual changes will first impact the 2018 valuation and FYE 2020 contributions so FY2019 contributions will not truly be impacted by these changes.

The actual long-term cost of the Plan is not based on assumptions. The actual cost is based on the benefits paid, the investment return and the other expenses paid. However, to orderly set aside money to prefund benefits, assumptions must be made about future events. To determine the current cost to prefund the pension plan requires that a number of assumptions be made about future events. As actual experience differs from these assumptions, the cost of the plan will gradually change. Ideally, the assumptions will be close to this experience. However, some assumptions (e.g., investment return) will commonly vary materially from year to year.

While the cost of the plan will "self-adjust" to reflect actual experience, it is important to review and reset the assumptions from time to time to (1) minimize experience gains and losses, (2) reduce contribution volatility and (3) achieve a better level of intergenerational taxpayer equity.

The Retirement Plan Committee is responsible for managing and administering the plans. A part of this responsibility is having an actuary perform annual valuations to determine the recommended cash contributions to the plans.

When considering our recommendations, we also looked at the experience shown in the prior experience study prepared in 2014.

Section I. Introduction

Certain economic assumptions (i.e., inflation) are not based solely on the Plan's experience during the past four years, and therefore require a longer period of experience to be considered as well as future expectations. Three of the key assumptions are tied to the economy. They are (1) cost of living adjustments (COLA) or CPI increases, (2) salary increases, and (3) the investment return assumption. It is possible that a decrease in the COLA assumption, and some increase in the salary increase assumption would be reasonable. We suggest that you consider lowering the 7.50% investment return assumption (and discount rate) to 7.25%. We recommend that these assumptions continue to be monitored.

In preparing this study, we have relied primarily upon annual actuarial valuation data provided to us by Howard County. The Plan's investment advisor also supplied some data specifically for this study.

Professional Qualifications

We are available to answer any questions on the material in this report or to provide explanations or further details as appropriate. The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services, which could create a conflict of interest and impair the objectivity of our work.



Thomas B. Lowman, FSA, EA, MAAA



Ann M. Sturner, FSA, EA, MAAA



Section II. Summary of Recommendations

The last 10 years has been an unusual period of time both nationally and for Howard County. While the economic markets have largely recovered from the implosion of the real estate, debt and equity markets in 2008 and the first quarter of 2009, the recovery has been slow, with both short and long term effects on the County's finances. We have considered this in our review of the last four years' demographic and economic pension plan experience, and in our recommendations for changes to the assumptions used to determine the pension contributions and funding levels.

We make the following recommendations:

- Update mortality tables to more recent standard tables. Plan experience too small in scale to rely on.
- Lower retirement rates at 20 years of service and raise rates at 24 years
- Slightly lower employee turnover rates for Police Officers and small adjustments for Firefighters
- Increase disablement rates 25% for Firefighters
- Raise salary increase assumption by an average of 0.56% for Police Officers. Small changes for Firefighters.

In addition, we suggest you consider the following changes even if done gradually:

- Revise the inflation assumptions from 2.75% to 2.50%.
- Revise the investment return assumption from 7.50% to 7.25%.

We discuss the actual experience and the reasons for these recommended assumption changes in Sections III (demographic assumptions) and IV (economic assumptions) and reflect the effect of these changes on the pension funding level and required contributions in Section VI.



Section III. Demographic Assumptions

This section addresses our review and recommendations regarding all demographic assumptions. The order we address these assumptions is the order of significance of the assumption in determining plan liabilities.

Mortality

The current assumed mortality rates for all healthy and disabled participants are based on the RP 2000 Mortality Table as follows:

- *Pre-Retirement Healthy*: The base mortality rates are the RP-2000 Combined Mortality Table (sex distinct) with ages set back by two years. The base mortality rates are then projected using Scale AA.
- *Post-Retirement Healthy and Disabled*: The base mortality rates are the RP-2000 Combined Mortality Table (sex distinct). The base mortality rates are then projected using Scale AA.

The active mortality was very close to expected mortality while the retiree mortality was less than the expected rates. The plan is not large enough to base their assumption just on their own experience. Therefore, our general approach is just to update the assumption to a more current table.

The current mortality tables have become outdated and we recommend changing to a more current mortality table. In 2014, the Society of Actuaries (SOA) released the RP2014 mortality tables and annually releases new mortality improvement scales (most recent is MP2017). We do note that the retiree group is young and while overall the new table is more conservative, that is not true at younger ages.

In August 2018, the SOA released an Exposure Draft of new mortality tables for public retirement plans (Pub-2010 mortality tables). We do not recommend adopting the new the Pub-2010 tables until they are final. These tables show that nationally experience is that the “White Collar” table is a closer fit than the RP2014 table and general employees have a slightly higher mortality rate than public safety employees. While our experience is limited, the County’s public safety experience is actually better than general employees and the White Collar table would predict only about 9 deaths for the public safety when there actually were only 7.

Therefore, for all active and in-pay participants, we recommend initially adopting the RP2014 Combined Mortality Table for males and females with generational projection using scale MP2017 for males and females. Once the Pub-2010 tables are final, we can review the new tables and make recommendations for changes.



Section III. Demographic Assumptions

Mortality

The following table summarizes the pre-retirement mortality experience for active participants over the plan years ending June 30, 2014 through June 30, 2017 and illustrates the expected experience using the new mortality tables.

Pre-retirement Deaths 2014-2017						
Group	Exposed	Expected (Current Rates)	Actual	Expected (Proposed Rates)	Ratio of Actual to Expected	
					Current Assumptions	Proposed Assumptions
Police Officers	1,813	1.41	1	1.50	71%	67%
Firefighters	1,671	1.43	1	1.54	70%	65%

The following table summarizes the post-retirement mortality experience for healthy retirees, disabled retirees, and surviving spouses over the same 2014-2017 period and illustrates the expected experiencing using the new mortality tables.

Post-retirement Deaths 2014-2017						
Group	Exposed	Expected (Current Rates)	Actual	Expected (Proposed Rates)	Ratio of Actual to Expected	
					Current Assumptions	Proposed Assumptions
Police Officers and Firefighters Combined	1,380	10.93	7	14.27	64%	49%



Section III. Demographic Assumptions

Retirement

Retirement experience is dependent on the plan provisions. The following are the key provisions:

Normal retirement with unreduced benefits can occur at the earlier of (1) the attainment of age 62 with 5 years of eligibility service or (2) the completion of 20 years of eligibility service. There is no “Early Retirement”. Benefit accrual rates after 20 years of service are different for Police Officers versus Firefighters. Prior to January 1, 2015, Police Officers can elect to enter the Deferred Retirement Option Plan I (DROP I) at 25, 26 or 27 years of service. Effective January 1, 2015, both Police Officers and Firefighters can elect to enter DROP II at 25 or more years of service.

The current assumptions (probability of retiring) are tied to years of service. DROP participants are considered “retired” when they exit DROP. The current retirement rates were first used for the July 1, 2015 actuarial valuation and were intended to reflect expected experience under DROP II.

Member who elect to enter DROP II must remain in DROP II at least 18 months but not more than 5 years to receive DROP II benefits. Since DROP II was not in effect for the entire experience study period and has not been in effect for 5 years, the credibility of the experience is limited.

We reviewed the expected and actual experience; however, we only recommend making minimal changes to the retirement assumptions. We recommend monitoring the retirement experience over the next few years and possibly making some additional adjustments to the retirement rates prior to the next experience study if necessary.



Section III. Demographic Assumptions

Retirement

Police Officers

The following table summarize the retirement experience for Police Officers over the years ending June 30, 2014 through 2017. Participants who have elected to enter DROP are assumed to remain in DROP for four years, or until 35 years of service, if earlier. Overall, retirement experience was less than expected. Certain service bands were higher than expected while others were lower than expected.

Retirement Rates - Police Officers 2014-2017									
Service Group	Exposed	Current Retirement Rate	Expected (Current Rates)	Actual	Proposed Retirement Rate	Expected (Proposed Rates)	Ratio of Actual to Expected		
							Current Assumptions	Proposed Assumptions	
20 or less	50	15.00%	9.50	3	5.00%	4.50	32%	67%	
21-23	106	3.00%	3.18	2	3.00%	3.18	63%	63%	
24	55	20.00%	10.40	14	25.00%	12.75	135%	110%	
25	48	8.00%	3.08	5	8.00%	3.08	162%	162%	
26-28	98	8.00%	24.56	15	8.00%	24.56	61%	61%	
29	10	8.00%	4.16	2	8.00%	4.16	48%	48%	
30	1	100.00%	1.00	0	100.00%	1.00	0%	0%	
31	1	100.00%	1.00	0	100.00%	1.00	0%	0%	
32	0	100.00%	0.00	0	100.00%	0.00	0%	0%	
33	0	100.00%	0.00	0	100.00%	0.00	0%	0%	
34	0	100.00%	0.00	0	100.00%	0.00	0%	0%	
35 and over	0	100.00%	0.00	0	100.00%	0.00	0%	0%	
Total	369		56.88	41		54.23	72%	76%	



Section III. Demographic Assumptions

Retirement

Firefighters

The following table summarize the retirement experience for Firefighters over the years ending June 30, 2014 through 2017. Participants who have elected to enter DROP are assumed to remain in DROP for four years, or until 35 years of service, if earlier. Overall, retirement experience was less than expected. Certain service bands were higher than expected while others were lower than expected.

Retirement Rates - Firefighters 2014-2017									
Service Group	Exposed	Current Retirement Rate	Expected (Current Rates)	Actual	Proposed Retirement Rate	Expected (Proposed Rates)	Ratio of Actual to Expected		
							Current Assumptions	Proposed Assumptions	
20 or less	31	10.00%	8.10	4	5.00%	6.60	49%	61%	
21-23	96	5.00%	4.80	0	5.00%	4.80	0%	0%	
24	43	7.50%	3.20	5	10.00%	4.30	156%	116%	
25	41	3.00%	0.70	0	3.00%	0.70	0%	0%	
26-28	84	3.00%	2.90	4	3.00%	2.90	138%	138%	
29	15	5.00%	1.60	1	5.00%	1.60	63%	63%	
30	8	10.00%	0.20	0	10.00%	0.20	0%	0%	
31	6	5.00%	1.20	2	5.00%	1.20	167%	167%	
32	6	5.00%	0.30	0	5.00%	0.30	0%	0%	
33	7	5.00%	0.40	0	5.00%	0.40	0%	0%	
34	6	5.00%	0.30	0	5.00%	0.30	0%	0%	
35 and over	7	100.00%	6.00	3	100.00%	6.00	50%	50%	
Total	350		29.70	19		29.30	64%	65%	



Section III. Demographic Assumptions

Termination of Employment

Current termination assumptions vary based on length of service. We assume that the longer an employee has worked for the County, the lower the probability of termination. This is consistent with recent experience. Separate rates are used for Police Officers and Firefighters.

Police Officers

The following table summarizes the termination experience for Police Officers over the years ending June 30, 2014 through 2017. Termination experience was less than expected. We recommend decreasing the rates for some of the service groups. We have not decreased the rates fully to raise the Actual to Expected ratio to 100% because the economy may still be causing members to be less likely to quit their jobs. We will continue to monitor experience in the upcoming actuarial valuations.

Termination Rates - Police Officers 2014-2017								
Service Group	Exposed	Current Termination Rate	Expected (Current Rates)	Actual	Proposed Termination Rate	Expected (Proposed Rates)	Ratio of Actual to Expected	
							Current Assumptions	Proposed Assumptions
0	53	7.00%	3.71	2	6.00%	3.18	54%	63%
1	53	4.00%	2.12	0	3.00%	1.59	0%	0%
2	56	2.00%	1.12	1	2.00%	1.12	89%	89%
3	52	2.00%	1.04	1	2.00%	1.04	96%	96%
4	89	2.00%	1.78	0	2.00%	1.78	0%	0%
5-9	544	1.50%	8.17	6	1.25%	6.80	73%	88%
10-14	315	1.00%	3.15	0	0.50%	1.59	0%	0%
15-19	282	0.00%	0.00	3	0.00%	0.00	0%	0%
20 and over	0	0.00%	0.00	0	0.00%	0.00	0%	0%
Total	1,444		21.09	13		17.10	62%	76%

Exposures are limited to employees that are not retirement eligible.



Section III. Demographic Assumptions

Termination of Employment

Firefighters

The following table summarizes the termination experience for Firefighters over the years ending June 30, 2014 through 2017. Overall, termination experience was less than expected, but slightly higher for two service groups. We recommend modifying the rates for some of the service groups, but the overall expected number of terminations remains essentially the same. We have not changed the rates fully to raise the Actual to Expected ratio to 100% because the economy may still be causing member to be less likely to quit their jobs. We will continue to monitor experience in the upcoming actuarial valuations.

Termination Rates - Firefighters 2014-2017									
Service Group	Exposed	Current Termination Rate	Expected (Current Rates)	Actual	Proposed Termination Rate	Expected (Proposed Rates)	Ratio of Actual to Expected		
							Current Assumptions	Proposed Assumptions	
0	64	4.00%	2.52	2	4.00%	2.52	79%	79%	
1	61	4.00%	2.40	3	4.00%	2.40	125%	125%	
2	80	2.00%	1.60	2	2.50%	2.00	125%	100%	
3	74	2.00%	1.48	1	2.50%	1.86	68%	54%	
4	42	2.00%	0.82	1	2.50%	1.03	122%	97%	
5-9	440	1.00%	4.39	1	0.75%	3.30	23%	30%	
10-14	307	0.50%	1.54	1	0.50%	1.54	65%	65%	
15-19	253	0.00%	0.0	0	0.00%	0.0	0%	0%	
20 and over		0.00%	0.0	0	0.00%	0.0	0%	0%	
Total	1,321		14.75	11		14.65	75%	75%	

Exposures are limited to employees that are not retirement eligible.



Section III. Demographic Assumptions

Disability Incidence and Type of Disability

The disability assumption is based on age. We assume that the older the employee, the higher the probability of becoming disabled. Different disability rates apply to Police Officers and Firefighters.

The following table summarize the disability experience for Police Officers and Firefighters over the years ending June 30, 2014 through 2017.

Group	Exposed	Disability Rates 2014-2017			Ratio of Actual to Expected	
		Expected (Current Rates)	Actual	Expected (Proposed Rates)	Current Assumptions	Proposed Assumptions
		Police Officers	1,813	4.32	4	4.32
Firefighters	1,671	2.67	6	3.37	225%	178%

As you can see, the data is limited in size, so we have also considered the experience in the prior experience study which included the years ending June 30, 2009 through June 30, 2013 when making recommendations.

For Police Officers, in the prior study there were 3 actual disabilities and 3.9 expected disabilities (using the current assumptions). Thus, the Actual to Expected ratio for the 8-year period is 85% (7 Actual divided by 8.2 Expected). We are not suggesting any changes to the disability rates for Police Officers at this time.

For Firefighters, in the prior study there was 1 actual disability and 2.1 expected disabilities (using the current assumptions). Thus, the Actual to Expected ratio for the 8-year period is 146% (7 Actual divided by 4.8 Expected). We recommend increasing all disability rates by 25% for Firefighters. We are not increasing the rates enough to produce an Actual to Expected ratio of 100% because we do not know whether the current 4-year period is representative of long term experience. We will monitor future experience in the upcoming actuarial valuations.

We currently assume that 85% of all disabilities occur in the line of duty. All four of the Police Officer disabilities and four of the Firefighter disabilities, or 80% of the total disabilities, occurred in the line of duty. We do not recommend changing this 85% assumption due to the small number of disabilities. We will review this assumption again in the next experience study.



Section III. Demographic Assumptions

Beneficiary Demographics

Percentage of participants with an eligible spouse: (for death benefit purposes)	70% with a spouse of the opposite gender, three years younger than a male participant, and three years older than a female participant.
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The current percentage married assumption is 70%. We do not have exact data to base an assumption on. The MetLife 2018 “US Employee Benefit Trends Study” shows that 70% of employees surveyed were either married or Domestic Partners. We are recommending staying at 70%.

Based on our review of retiree data, we believe the current assumption regarding the difference in average age between participants and their spouses adequately represents actual experience.

Sick Leave

We currently assume the additional service that employees receive credit for at retirement in lieu of unused sick leave adds 2.4% to employees’ creditable service for Police Officers and 2.2% to employees’ creditable service for Firefighters. We have not studied this as it is a minor assumption.



Section IV. Economic Assumptions

Inflation

The inflation assumption is at the heart of the economic assumptions, as it is used as a starting point for all of the other economic assumptions, including the Cost-of-Living Adjustment (COLA), salary improvement and investment return assumptions. Thus, our experience analysis starts with the inflation assumption. The current inflation assumption is 2.75%.

Unlike demographic assumptions where past experience is often a good predictor of future experience, economic assumptions, and particularly investment return and inflation assumptions typically reflect future expectations more than past experience. So, we analyzed the inflation assumption from three perspectives:

- Past experience – based on the Consumer Price Index for all Urban Consumers (CPI) over the last 5, 10, 15, 20 and 25 years
- Current expectations of future experience – based on investment experts' analysis of future expected inflation
- Current, market-based expectations of future inflation – based on the difference between the treasury bond nominal yield curve and the Treasury Inflation Protected Securities (TIPS) yield curve. This curve is known as the Treasury Break-even Inflation yield curve (TBI).

Effective for the July 1, 2018 COLA, the retiree COLA is based on the consumer price index for "All Urban Consumers (CPI-U) Baltimore-Columbia-Towson, MD, all items, as published by the United States Department of Labor from February of the current year to February of the preceding year. Every July 1st the COLA is added to the monthly benefit of each retire and beneficiary who has been in pay status for 12 months or more.

The COLA assumption is based on the long-term expected average annual inflation rate adjusted for the plan's 2% limit. As a technical matter specific to this plan, the increase in a retiree's benefit can be more than 2%. The adjusted benefit is the lesser of (1) the annuity amount increased by the full percentage change in CPI or (2) the initial benefit amount increased by 2% each year since retirement. If the COLA is less than 2% in a year and the COLA is more than 2% in a subsequent year, retirees may get more than a 2% increase.



Section IV. Economic Assumptions

Inflation

Past experience

We first considered prior experience in developing our recommendation for the inflation assumption. The average annual increase in the CPI-U Baltimore-Columbia-Towson, MD over multiple time periods.

	Averaging Period				
	5 years	10 years	15 years	20 years	25 years
CPI-U	1.23%	2.10%	2.52%	2.29%	2.33%

Investment experts' inflation assumptions

Next, we considered the inflation assumption built into the investment return assumptions from the Plan's investment manager, Summit Strategies Group. As of June 30, 2018, Summit's 10- and 30-year investment return analysis includes a 2.0% inflation assumption. Also of interest is the forecast of the Philadelphia branch of the Federal Reserve Bank, which in the second quarter of 2018 projected 10-year inflation to run at 2.3% (identified as Long-Term for the 2018 to 2027 period).

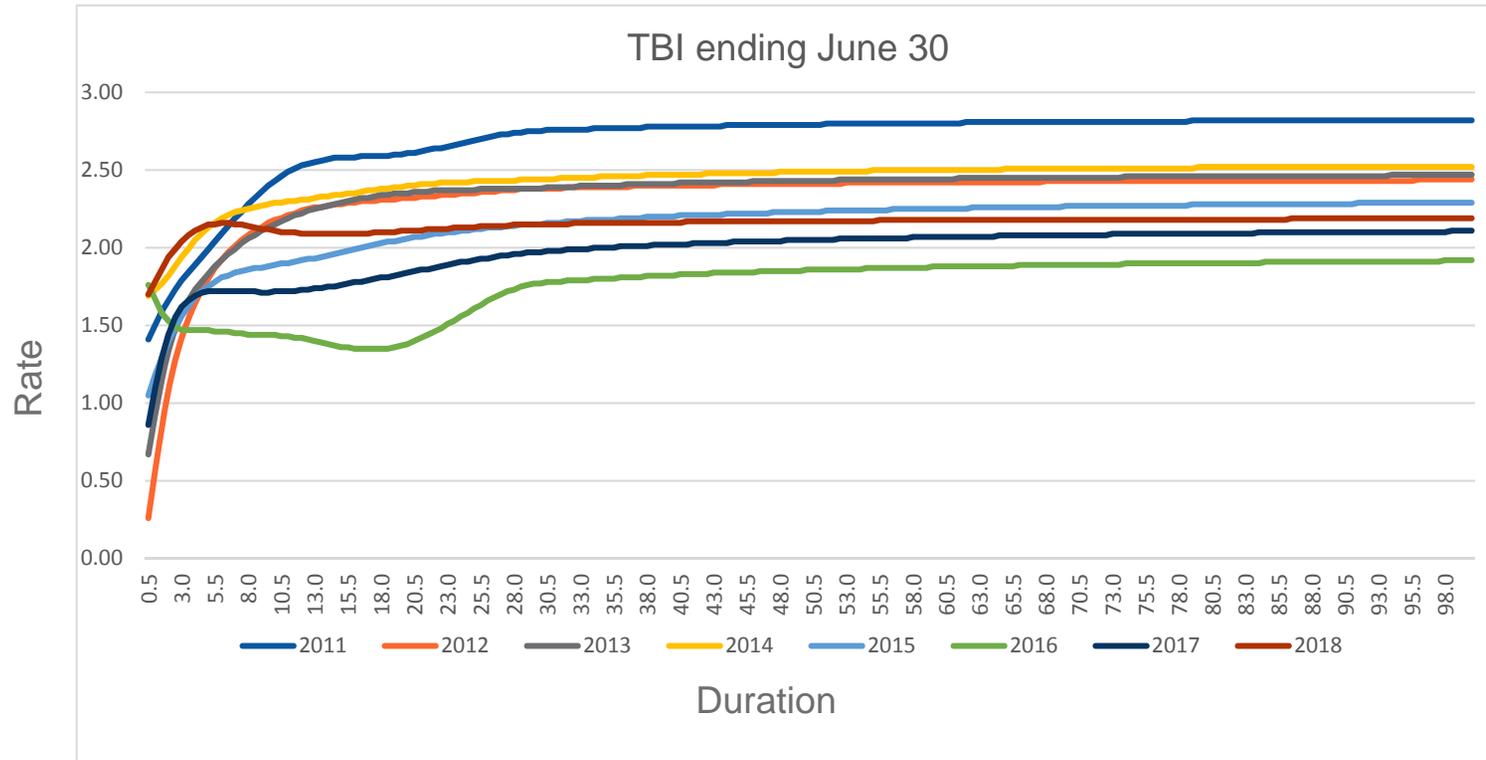
TBI return

Finally, we considered the inflation expectations built into the difference between the nominal treasury yields and the TIPS yields. The following table shows the TBI yields as of the present.

We note that there are some practical limitations of the TBI yields (principally the depth of the TIPS markets, and the limited duration of both the TIPS and Treasury bonds.) However, we believe that the TBI does provide a reasonable, independent and market related method of considering long-term inflation rate expectations.

Section IV. Economic Assumptions

Inflation



Comparison of Implicit Inflation Rates, in Percent, and Period in Years

We note that the TBI yield curve graphs for 2016 and 2011 are significantly different than those for the other four years, which are clustered between 2.15% and 2.5%, except for very short durations.



Section IV. Economic Assumptions

Inflation

Recommended inflation assumption

All of the above-mentioned information points to some lowering of our inflation assumption. If we lower the discount rate from 7.5% to 7.25%, we recommend decreasing the current 2.75% assumption for CPI increases to 2.50%. For the Police and Fire Plan, the COLA assumption is based on the long-term expected average annual inflation rate adjusted for the plan's 2% limit. Our current assumption is that the COLA will equal 2%. We recommend continuing the 2% assumption.



Section IV. Economic Assumptions

Investment Return

The single assumption that has the largest effect on the determination of plan liabilities, funding levels and contributions is the investment return assumption. Our belief is that historic investment experience, while interesting, is of little value in accessing the validity of an investment return assumption. We also note that the only certainty about future investment returns is that any assumption is most likely wrong, both in the short-term and in the long-term. While we typically suggest an investment return assumption based on the best estimate of the future investment return, reflecting investment advisors' investment return expectations and the plan's investment mix, we also recognize the value of choosing conservative investment return assumptions, trying not to assume the market expectations but to choose a return more likely to be exceeded than to not be met.

The current investment rate of return assumption on the market value of assets is 7.50%, net of investment expenses.

Historical returns

The following table summarizes the rates of return on the market value of assets over the period from July 1, 2012 through June 30, 2017 (five fiscal years).

Actual rates of return on market value of assets						
	2013	2014	2015	2016	2017	5-year average
Police and Fire Plan	11.1%	15.7%	2.8%	1.5%	12.3%	8.5%

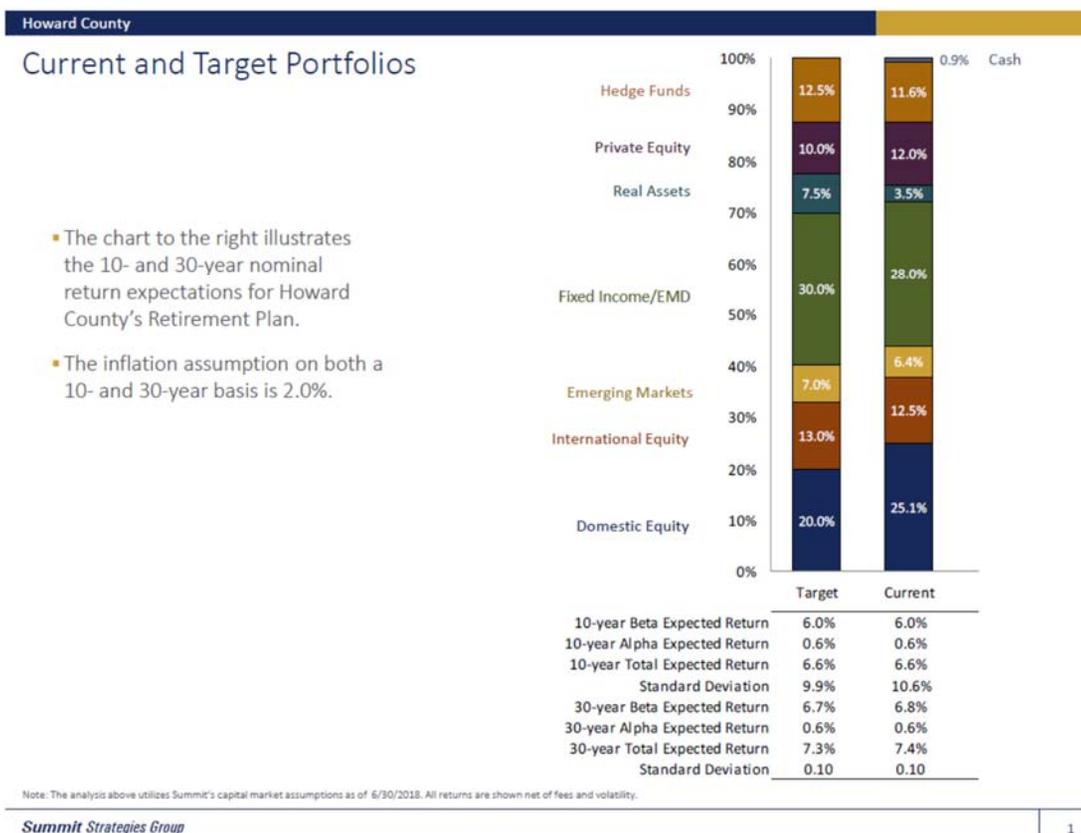


Section IV. Economic Assumptions

Investment Return

Investment advisor expectations

In July 2018, the Plan's investment advisor (Summit Strategies) provided us with information on nominal rates of return (including inflation at 2.0% and "alpha" but net of investment fees).



Section IV. Economic Assumptions

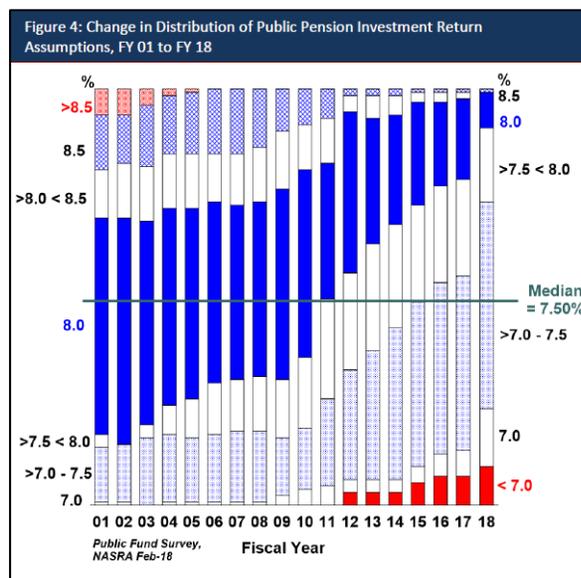
Investment Return

The expected target returns of 6.6% (10-year) and 7.3% (30-year) are lower than the current net rate of 7.50% but are based on a 2.00% inflation assumption and not the current 2.75% or proposed 2.5% inflation assumption.

If we follow our recommendation above and lower the 2.75% inflation assumption to 2.50% (and raise the Summit assumption from 2.00% to 2.50%), the range of returns in the Summit exhibit become 7.1% (10-year) and 7.8% (30-year). The current 7.5% assumption is within this range as is 7.25%.

NASRA

We also considered the National Association of State Retirement Systems' (NASRA) annual Public Pension Plan Investment Return Assumptions (dated February 2018) reflecting 2017 investment return assumptions used by states (and some large cities). These returns reflect a continued pattern of decreasing investment return assumptions, with an expectation that the current average of slightly more than 7.5% will continue to decline over the next two years. While we would not suggest setting investment return assumptions solely based on this survey, we believe it is useful to know what other plans are doing and review the investment assumption trends.





Section IV. Economic Assumptions

Investment Return

Recommended investment return assumption

Currently the investment return, or discount rate, assumption is 7.50%, which is effectively a 2.75% inflation assumption and a 4.75% “real” investment return (i.e., net of inflation).

Based on the review of the investment advisor’s expectations and our recommendation to decrease the inflation assumption from 2.75% to 2.50%, we urge the Plan to consider reducing the investment return assumption from 7.50% to 7.25%. The Impact of Changes shown in Section VI include the impact of all the assumption changes using both 7.50% and 7.25% investment returns.

Non-Investment Expenses

The expense load for non-investment expenses is equal to the average of the prior two years’ non-investment expenses increased with assumed inflation and rounded to the nearest \$1,000. As these are auto-adjusting, we see no need to change them.



Section IV. Economic Assumptions

Pay increases

The current pay increase assumption varies by service. The shorter the service of the employee, the higher the assumed pay increase. The current assumed salary scale is the same for Police Officers and Firefighters. We looked at their experience separately and found that salary increases for Police Officers are higher than the expected increases, while the Firefighter increases averaged very close to the expected increases. Since this is the second experience study in which the Police Officers' increases were higher than expected, we are now recommending a different assumption for Police Officer and Firefighters.



Section IV. Economic Assumptions

Pay increases

Police Officers

The following table summarize the pay increases for Police Officers over the years ending June 30, 2014 through 2017. Police Officers received salary adjustments of 2%, 3%, 4% and 2% in FY14 to FY17 respectively, or an average of 2.75%, which is the current inflation assumption. We propose increasing the rates for all service groups except for 0-4 years. These proposed rates do not decrease the Actual to Expected ratio to 100% because we want to continue to monitor pay increases over several more years, since there are often significant variations in pay increases.

Salary Percent Increases - Police Officers 2014-2017						
Service Group	Average Expected Increase	Average Actual Increase	Current Assumption	Proposed Assumption	Ratio of Actual to Expected	
					Current Assumptions	Proposed Assumptions
0-4	7.55%	7.20%	7.55%	7.50%	95%	96%
5-9	6.55%	7.57%	6.55%	7.25%	116%	104%
10-14	5.85%	7.54%	5.85%	6.75%	129%	112%
15-19	5.80%	7.77%	5.80%	6.50%	134%	119%
20-24	4.55%	5.32%	4.55%	5.25%	117%	101%
25 and over	4.25%	4.40%	4.25%	4.25%	103%	103%
Weighted Average	5.84%	6.83%		6.40%	117%	107%



Section IV. Economic Assumptions

Pay increases

Firefighters

The following table summarize the pay increases for Firefighters over the years ending June 30, 2014 through 2017. Firefighters received salary adjustments of 2%, 4%, 4% and 2% in FY14 to FY17 respectively, or an average of 3.0%, which is slightly higher than the current inflation assumption. We propose changing the rates for several service groups in order to smooth out the individual Actual to Expected ratios. Overall the Actual to Expected ratio remains essentially unchanged. Like Police Officers, we will continue to monitor pay increases over several more years, since there are often significant variations in pay increases.

Salary Percent Increases - Firefighters 2014-2017						
Service Group	Average Expected Increase	Average Actual Increase	Current Assumption	Proposed Assumption	Ratio of Actual to Expected	
					Current Assumptions	Proposed Assumptions
0-4	7.55%	8.74%	7.55%	7.75%	116%	113%
5-9	6.55%	6.58%	6.55%	6.55%	100%	100%
10-14	5.85%	5.79%	5.85%	5.85%	99%	99%
15-19	5.80%	4.93%	5.80%	5.50%	85%	90%
20-24	4.55%	4.03%	4.55%	4.35%	89%	93%
25 and over	4.25%	4.37%	4.25%	4.25%	103%	103%
Weighted Average	5.81%	5.73%		5.76%	99%	100%



Section IV. Economic Assumptions

Payroll Growth Assumption

We currently assume that payroll will grow 2.75% annually for purposes of amortizing the unfunded actuarial liability. Recent experience is that total payroll for Police Officers and Firefighters has increased about 5.5% annually over the last four years but headcount has also changed. Per participant payroll has increased by 3.8% annually over the last four years. We recommend retaining the current assumption that payroll will grow 2.75% annually for purposes of amortizing the unfunded actuarial liability.

Payroll changes - Police Officers and Firefighters Combined 2014-2017						
	7/1/2013	7/1/2014	7/1/2015	7/1/2016	7/1/2017	4-year average
Total Payroll	\$64,693,223	\$69,081,338	\$72,790,095	\$75,678,677	\$80,071,119	
Increase in total payroll		6.8%	5.4%	4.0%	5.8%	5.5%
Number of active participants	849	882	882	872	904	
Payroll per participant	\$76,199	\$78,324	\$82,528	\$86,787	\$88,574	
Increase in per participant payroll		2.8%	5.4%	5.2%	2.1%	3.8%

Payroll is based on pay rates as of July 1 of each year.



Section V. Funding Methods and Other Concerns

Asset Smoothing Methods

The plan has a five-year smoothing method to defer recognition of investment returns above or below the 7.50% assumption. In addition, the actuarial value of assets can be no less than 50% of market value of assets and no more than 150% of market value of assets. We believe that the current method meets the current standard of practice and accounting rules. We recommend retaining the current asset smoothing method.

Amortization Policy

The current amortization the sum of the following:

- a. Gains and losses amortized over a 15-year closed (layered) period
- b. Assumption changes over a 15-year closed period
- c. Post-2013 plan improvements over the average expected future working period
- d. Early retirement incentives (if any) over 5 years or less
- e. Surplus, when reached, over 30 years

The plan's policy falls in the Conference of Consulting Actuaries White Paper's practice category of "Model LCAM Practice". We recommend retaining the current amortization policy.

Risk Free Rates of Return (or Bond Rates) for Discount Rates

Like the other assumptions, the investment rate of return assumption is based on a "best estimate" methodology. We believe that the current method meets the current standard of practice and accounting rules. However, these rules are currently under discussion. Some believe that liabilities should be discount at a rate that is independent of how assets are invested (e.g. use bond rate to discount liabilities). The Actuarial Standard Board is working on new standards that would require disclosure of liabilities using bonds rate.



Section VI. Impact of Changes

The estimated cost for the changes recommended in this report was developed based on the July 1, 2017 census and asset information. The recommended assumption changes result in the estimated County contributions shown in the table below as estimated dollar amounts and contribution rates as a % of participant payroll. Note the assumption changes will take effect with the 2018 valuation (FY2020 contribution) and not the 2017 valuation (FY2019 contribution).

The following charts show the impact of all the assumption changes on the County's contribution rate.

	Amount	Percentage of Total Payroll	7/1/2017 Funded Ratio Actuarial Value of Assets	7/1/2017 Funded Ratio Market Value of Assets
FY2019 Actuarially Determined Contribution				
No Assumption Changes	\$27,974,552	33.1%	82.6%	82.5%
With Assumption Changes				
7.50% Net Investment Return	\$28,895,005	34.2%	82.0%	82.0%
7.25% Net Investment Return	\$32,118,340	38.0%	79.3%	79.2%



Section VII. Data, Methods and Assumptions Applied in the Experience Study

We used participant data initially prepared for the actuarial valuations for the years starting July 1, 2013 through July 1, 2017.

We determined, for each year, the actual incidence of each demographic assumption, based on the participant's age nearest birthday and years of service as of the beginning of the year and compared that to the expected incidence, determined using the same factors.