



Howard County Retirement Plan

Experience Study Report
July 1, 2017 to July 1, 2021 Experience

Bolton

Submitted by:

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September 15, 2022

Retirement Plan Committee
Howard County Retirement Plan
3430 Court House Drive
Ellicott City, MD 21043

Re: *Howard County Retirement Plan Experience Study*

Dear Committee Members,

This report presents the results of our experience study of the Howard County Retirement Plan and includes our recommended changes to plan assumptions. These recommendations are based on:

- Our findings from the study of the demographic and economic experience of the plan for the period July 1, 2017, through June 30, 2021, and
- Our expectations, based on professional judgement, estimates inherent in market data, emerging trends, and expert opinions, of future experience

We summarize our recommendations in the *Summary of Recommendations* section and analyze our findings in the *Demographic Assumptions* and *Economic Assumptions* sections. Finally, we present in the *Impact of Changes* section the effect of the proposed changes on plan liabilities, funding levels, and annual contribution for the July 1, 2021 actuarial valuation.

Respectfully submitted,

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Section I. Introduction

This report reviews the actuarial experience of the Howard County Retirement Plan (the “Plan”) during the four-year period from July 1, 2017, to June 30, 2021, in order to consider changes in actuarial 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. Based on the review of plan experience and considerations regarding future expectations, several changes in actuarial assumptions are recommended for approval by the Committee.

The County, with recommendations from the Committee, is entrusted with setting the assumptions for the actuarial valuations. To keep the actuary’s liability and contribution calculations in concert with reality, the assumptions used must be reasonably related to the circumstances surrounding the plan as currently written. Generally, the best way to maintain reasonable assumptions is to periodically compare past plan experience to the assumptions incorporated by the actuary and, as a result of that comparison and the consideration of future expectations, recommend improvements, where necessary, for use in the valuation process.

Section VI of the report shows the impact of proposed changes to the liabilities, funding levels, and annual contributions for the July 1, 2021, valuation, which develops the contributions for FY2023. Actual changes will first impact the July 1, 2022 valuation and FY2024 contribution.

The actual long-term cost of the plan is not dependent on assumptions but rather will be based on actual plan experience, including changes in plan demographics and fluctuations in the general economy (such as variations in inflation or interest rate levels), which translate into tangible costs for the plan through:

- (1) the plan benefits paid (including cost-of-living adjustments (COLAs) on post-retirement benefits as applicable),
- (2) the investment return on plan assets, and
- (3) the payment of other plan-related expenses.

Despite the lack of influence that assumptions have on long-term plan costs, a current value of expected future plan benefits needs to be calculated regularly (generally, annually) to orderly determine an appropriate amount of money to set aside for prefunding benefits. Such a determination requires the use of assumptions about future events. As actual experience differs from the assumptions, the expected cost of the plan and, consequently, the contributions to fund the plan generally will gradually change. Ideally, the assumptions will closely track actual experience. However, for some assumptions (e.g., investment return), actual experience will commonly and materially vary from the assumption from year to year. As such, reasonable assumptions should not only be appropriate for the purpose of the measurement, but they should also be unbiased in nature such that they balance expected upward and downward deviations in experience.



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.

For some assumptions (e.g., mortality), the experience of the plan alone is insufficient to be statistically significant, and as such, industry tables and experience should be considered when setting those assumptions. Also, certain economic assumptions (i.e., inflation) are not based solely on recent plan experience and require longer periods of experience to be considered in conjunction with future expectations. The long-term inflation assumption generally is used as the principle building block for the following key economic assumptions:

- (1) Investment returns
- (2) Cost of living adjustments
- (3) Pay increases

In conducting this experience study, we emphasized the importance of developing assumptions that reflect a best estimate of *future* plan experience. Rather than change every assumption to exactly match actual recent experience, we have analyzed the *trends* inherent in that experience and have developed assumptions that reflect expectations of future experience.

Bolton has prepared this report exclusively for the Committee and the County. The purpose of this report is to provide recommended assumption changes and the impact of those recommendations on plan liabilities and annual contributions. This report may not be used or relied upon by any other party or for any other purpose; Bolton is not responsible for the consequences of any unauthorized use.

This report is based on data provided by or at the direction of the County (see Section VII for further details). The County is solely responsible for the validity, accuracy, and comprehensiveness of this information. If the data or plan provisions supplied are not accurate and complete, the experience study results may differ significantly from the results that would be obtained with accurate and complete information; such a scenario could require a later revision of this report.

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 that could create a conflict of interest that would impair the objectivity of our work.



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Section II. Summary of Recommendations

The period since 2007 has been an unusual period of time. By early 2020, the economic markets had largely recovered from the implosion of the real estate, debt, and equity markets in 2008 and the first quarter of 2009. The recovery had been slow, with both short- and long-term effects on government finances. Then COVID-19 hit. We have tried to consider all of these environments in our review of the four years of demographic and economic pension plan experience from July 1, 2017, through June 30, 2021, and in our recommendations for changes to the assumptions used to determine the pension contributions and funding levels.

The following tables summarize the current economic assumptions, demographic assumptions, and actuarial methods and provide the recommendations that are detailed in this report.

Economic Assumptions

Assumption	Current	Recommendation
Inflation / COLA for post-retirement benefits	2.50%	No changes
Investment Return / Discount Rate	7.25%	No change; review annually
Pay Increases	Separate service-based rates for General Employees and Corrections Employees	Corrections: Decrease rates for all years of service All Others: No changes
Payroll Growth	2.75%	No change
Administrative Expenses	Average of prior two years increased with assumed payroll growth and rounded to the nearest \$1,000	No change



Demographic Assumptions

Assumption	Current	Recommendation
Mortality and Longevity	<p>Society of Actuaries RP-2014 Total Dataset Mortality Tables projected from the 2006 base year with Improvement Scale MP-2017</p> <p>Healthy Actives, Terminated Vested Participants, and Retirees RP-2014 Employee and Healthy Retiree with MP-2017</p> <p>Disabled Retirees RP-2014 Healthy Retiree with MP-2017</p> <p>Contingent/Beneficiaries RP-2014 Healthy Retiree with MP-2017</p>	<p>Society of Actuaries Pub-2010 General or Safety Amount-Weighted Mortality Tables (based on employee group) projected from the 2010 base year with Improvement Scale MP-2021 (update all tables to most recent MP scale as of each valuation date)</p> <p>Healthy Actives, Terminated Vested Participants, and Retirees Corrections and Deputy Sheriffs: Pub-2010 Safety Employee and Healthy Retiree with MP-2021</p> <p>All Others: Pub-2010 General Employee and Healthy Retiree with MP-2021</p> <p>Disabled Retirees Corrections and Deputy Sheriffs: Pub-2010 Safety Disabled Retirees with MP-2021</p> <p>All Others: Pub-2010 General Disabled Retirees with MP-2021</p> <p>Contingent/Beneficiaries Pub-2010 Contingent Survivor with MP-2021</p>
Retirement	Rates based on age and service	<p>General: Slightly reduce rates at some ages/service combinations</p> <p>Corrections: Reduce most rates; increase some rates between 21 and 24 years of service</p>
Termination of Employment	Rates based on service	<p>General: Increase rates for years of service between 2- 7; decrease rates for 0 and greater than 11 years of service</p> <p>Corrections: Increase rates for years of service between 2 – 6; decrease rates for 8 – 9 years of service</p>
Disability Incidence	Rates based on age	<p>General: Decrease rates by 15%</p> <p>Corrections: No change</p>

Assumption	Current	Recommendation
Unused sick leave	Service credit is 1.5% of creditable service	No change
Beneficiary demographics (for preretirement death benefit)	70% with beneficiary Female beneficiary 3 years younger than male participant and male beneficiary 3 years older than female participant	65% with beneficiary Female beneficiary 2 years younger than male participant and male beneficiary 2 years older than female participant

Actuarial Methods

Method	Current	Recommendation
Cost Method	Projected unit credit	No change, but consider studying entry age normal cost method
Asset Smoothing	Five-year smoothing of investment gains and losses with a 50%-150% corridor around the market value of assets	No change
Amortization of Unfunded Liabilities / (Surplus)	UAAL amortization period based on source and amount developed as a level percentage of payroll: <ul style="list-style-type: none"> - Gains/ losses: 15 years - Assumption/Method Changes: 15 years - Active plan amendments: Average future service - Inactive plan amendments: Not defined - Early retirement incentives: <= 5 years - Surplus: 30 years 	Modify plan amendment amortizations <ul style="list-style-type: none"> - Active plan amendments: lesser of average future service and 15 years - Inactive plan amendments: lesser of average life expectancy and 10 years

We discuss the actual experience and the reasons for these recommended assumption changes in Sections III (*Demographic Assumptions*) and IV (*Economic Assumptions*) and show the effect of these changes on the pension funding levels and required contributions in Section VI.

Section III. Demographic Assumptions

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

Recommended changes to assumptions do not imply that prior assumption sets were not appropriate for prior valuations. Rather, when changes to the assumptions are recommended, they are generally to keep up with emerging trends and changes in the sponsoring organization.

Mortality

Pension plans pay benefits for life, so estimates of longevity are an important element in assessing the funded status and funding needs of the program. Studies over the last two decades have shown a marked improvement in life expectancy. In addition, more studies have been conducted and subsequently published, which has allowed us to analyze differences between various professions and how other factors beyond gender factor into future longevity. While overall life expectancy has improved, the projected rates of future improvements have slowed with the most current improvement scales showing lower rates of improvement than scales developed a few years ago.

The COVID-19 pandemic had a significant impact on short-term mortality. Pension plan mortality is based on a future outlook of mortality, not on what has happened in the immediate past. As of the date of this report, there are two leading schools of thought regarding the impact of the pandemic on future mortality. The first opinion is that, because deaths related to COVID-19 were much more prevalent in older and sicker populations than in younger, healthier populations, mortality may actually improve over the short-term given that the current plan members generally are the healthier individuals who remain. The second opinion is that there could be more variants and the vaccines are either not widely taken or not as effective as originally thought and mortality could increase in the future. At this time, we do not recommend adjusting the mortality assumption for the pandemic. Instead, we recommend that the long-term impact of the pandemic be reviewed in the next experience study.

For the plan experience to be considered statistically credible, over 1,000 deaths are needed by gender. During the 4-year study period, there were a total of 74 post-retirement deaths and 14 pre-retirement deaths. Since membership in the plan is not large enough to allow us to create a custom set of tables, we recommend using the best available mortality tables that reflect the plan's demographics.

Current Assumptions – tables based on multiple types of pension plans

The current mortality assumption uses the RP-2014 mortality table. That table is based upon mortality experience in private, public, and federal sector plans between 2004 and 2008, and was developed to be a benchmark for U.S. private pension plan mortality experience.

Proposed Assumptions – tables based on public sector pension plans

In January 2019, the Society of Actuaries (SOA) released new mortality tables based exclusively on the experience of participants in public sector retirement plans. These tables (Pub-2010 mortality tables) featured versions that were specific to teachers, public safety, and general employees. The Pub-2010 tables were also developed based on head-count weighting (looking at the number of people who died) and benefit amount weighting (including the benefit amount in the death statistics). Mortality rates vary by income in that members with larger pensions are generally shown to live longer, on average, than members with lower pensions.



We recommend utilizing the amount-weighted public safety version of the tables for Corrections employees and Deputy Sheriffs and the amount-weighted general version of the tables for all other members.

Below we show the current assumption and recommended Pub-2010 tables based on the type of participant and job classification.

Healthy Actives, Terminated Vested Participants, and Retirees

Current: RP-2014 Mortality Table

Recommended: **Corrections and Deputy Sheriffs:** Amount-Weighted Pub-2010 Safety Employee and Healthy Retiree Mortality Tables

All Others: Amount-Weighted Pub-2010 General Employee and Healthy Retiree Mortality Tables

Disabled Retirees

Current: RP-2014 Mortality Table

Recommended: **Corrections and Deputy Sheriffs:** Amount-Weighted Pub-2010 Safety Disabled Retiree Mortality Table

All Others: Amount-Weighted Pub-2010 General Disabled Retiree Mortality Table

Contingent/Beneficiaries

Current: RP-2014 Mortality Table

Recommended: Amount-Weighted Pub-2010 Contingent Survivor Mortality Table

Furthermore, we recommend continuing the use of fully generational mortality improvement projection but recommend updating the improvement scale from MP-2017 to MP-2021 as of July 1, 2022 (for all groups) in order to capture more recent national experience. Additionally, we recommend the use of the mortality improvement scale most recently published as of each valuation date.

Future Considerations – tables based on current plan population

In February 2022, the Society of Actuaries (SOA) published a report titled *Mortality by Socioeconomic Category in the United States*. As stated in the Executive Summary:

Since around 1980, geographic and socioeconomic disparities in survival have been growing in the United States. An enhanced understanding of the differences in mortality patterns across subgroups of the population is essential for addressing the needs of the American public. While geographic and racial/ethnic variations in mortality are well documented, studies of socioeconomic differences have been lagging in the United States, in part because of data limitations.

In this report, the authors “construct a series of mortality indicators for groupings of U.S. counties based on their socioeconomic characteristics as measured by county-wide variables on education, occupation, employment, income and housing price and quality.” Advancements in data collection and analysis are leading actuaries to consider factor-based longevity models tailored to a plan’s population. We recommend that the Committee consider a study to determine how this type of model could reduce volatility due to changing mortality.

Retirement

Retirement patterns may change over the years and, for some plans, that shift can have a major impact on the plan costs. Later retirements can mean fewer years of payments but higher benefit amounts due to additional service credits or a higher pay level.

We analyzed the 2019-2021 data to determine whether the pandemic had a temporary impact on retirement behavior. The ratio of the number of retirements and terminations to exposures was not vastly different than the ratios during the 2017-2019 period. Thus, we have not made any adjustments to the data or our proposed assumption to isolate the impact of the pandemic.

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

General Employees: Normal retirement with unreduced benefits can occur at the earlier of (1) the attainment of age 62 with a few years of eligibility service¹, or (2) the completion of 30 years of eligibility service.

Corrections Employees and Participating Deputy Sheriffs²: Normal retirement with unreduced benefits can occur at the earlier of (1) the attainment of age 62 with a few years of eligibility service³, or (2) the completion of 20 years of eligibility service.

Both Groups: Early Retirement with reduced benefits can occur at the earlier of (1) the attainment of age 55 with 15 years of eligibility service, or (2) the completion of 25 years of eligibility service (General Employees).

Effective July 1, 2021, Correction Employees with at least 20 years of service can elect to enter the Deferred Retirement Option Program (DROP).

¹ More specifically, the requirement is age 62 with at least 2 years of eligibility service and the sum of age and service must be at least 67.

² Deputy Sheriffs hired on or after July 1, 2021.

³ Same requirement as General Employees.



General Employees

The first table below summarize the retirement experience for General Employees over the years ending June 30, 2018 through 2021. Overall, retirement experience was slightly less than expected so we reduced some of the rates, as shown in the second table below.

General Employees Retirements						
Category	Exposures	Expected	Actual	Actual / Expected	Proposed Expected	Actual / Proposed Expected
Early Retirement	500	19.9	15	75%	19.9	75%
Normal Retirement (NR), 1st Elig						
Age < 60	41	6.2	2	33%	4.9	41%
Age >= 60	118	19.7	17	86%	13.9	122%
NR, After 1st Elig						
Age < 50	2	0.2	0	0%	0.2	0%
50 <= Age <= 59	160	9.6	10	104%	9.3	108%
60 <= Age <= 74	789	156.9	133	85%	140.7	95%
Age >= 75	22	22.0	4	18%	22.0	18%
Total	1,632	234.5	181	77%	211.0	86%

General Employees Retirement Rates			
Category	Expected	Actual	Proposed
Early Retirement	4%	3%	4%
Normal Retirement (NR), 1st Elig			
Age < 60	15%	5%	12%
Age >= 60	17%	14%	12%
NR, After 1st Elig			
Age < 50	10%	0%	10%
50 <= Age <= 59	6%	6%	6%
60 <= Age <= 74	20%	17%	18%
Age >= 75	100%	18%	100%
Total	14%	11%	13%

Corrections Employees

The following table summarizes the retirement experience for Corrections Employees over the years ending June 30, 2018 through 2021 as well as the proposed rates (for Corrections Employees and Participating Deputy Sheriffs). Given that there weren't many retirements and that the DROP was not in effect during the experience study period, the recommended assumptions shown below were developed using a combination of actual experience and our knowledge of changes in retirement patterns when a DROP is available. DROP participants are considered "retired" when they exit DROP.

Category	Exposures	Retirements			
		Current Rates	Actual	Actual Rates	Proposed Rates
Early Retirement (ER)					
First Eligibility	11	40%	1	9%	5%
After First Eligibility	16	0.1	0	0%	5%
Normal Retirement (NR), Age < 70					
NR, Age < 62 and Service = 20	12	Various	5	42%	25%
NR, Age < 63 and Service = 21	5	Various	2	40%	5%
NR, Age < 64 and Service = 22	2	Various	0	0%	3%
NR, Age < 65 and Service = 23	2	Various	0	0%	2%
NR, Age < 66 and Service = 24	1	Various	0	0%	45%
NR, Age < 62 and Service >= 25	8	Various	2	25%	10%
NR, Others Age < 70	32	Various	9	28%	40%
NR, Age >= 70	0	100%	0	0%	100%
Total Number of Retirements	89	25.4	19	17.4	17.4

Corrections Employees who have elected to enter DROP are assumed to remain in DROP for four years. Corrections Employees who have not entered DROP and have more than 20 years of service on the valuation date are assumed to never enter DROP. For members with less than 20 years of service on the valuation date, all assumed retirement rates after 20 years of service and before 24 years of service are assumed to be regular retirements while all retirements rates at 24 years of service and beyond are assumed to be DROP exits.

GASB-specific retirement rates which are based on assumed DROP entry rather than DROP exit will be developed and documented in the future GASB report in which the July 1, 2022 liabilities are used.

Termination of Employment

Termination assumptions are designed to capture the rate and pattern at which active members leave employment with the sponsor for reasons other than retirement, disability, or death. Higher turnover for low-service (under five years) employees results in fewer members vesting in their pension benefits and higher turnover for long-service employees results in smaller pensions than had they worked until retirement age. A good turnover assumption helps to keep costs stable over the long term.

Similar to retirements rates, the pandemic did not appear to skew terminations heavily in either direction. Thus, we have not made any adjustments to the data or our proposed assumption to isolate the impact of the pandemic.

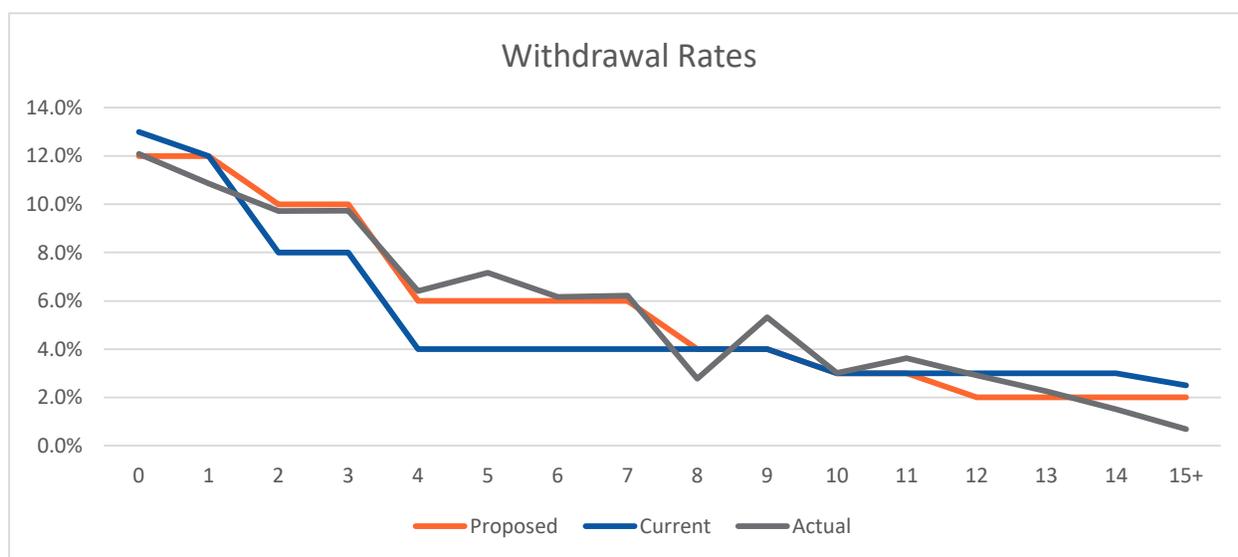
General Employees

Current termination assumptions vary based on service. Over the four years, the plan expected 345.1 withdrawals under the current assumptions and experienced 370. The following table shows the current rates and proposed rates. We propose increasing the rates for 2-7 years of service and decreasing rates for 12 or more years of service.

Service	Current Rate	Proposed Rate
0	13.00%	12.00%
1	12.00%	12.00%
2	8.00%	10.00%
3	8.00%	10.00%
4	4.00%	6.00%
5	4.00%	6.00%
6	4.00%	6.00%
7	4.00%	6.00%
8	4.00%	4.00%
9	4.00%	4.00%
10	3.00%	3.00%
11	3.00%	3.00%
12-14	3.00%	2.00%
15-19	2.50%	2.00%
>=20	0.00%	0.00%

The following table shows the number of withdrawal exposures, the expected number of withdrawals using the current and proposed rates, the actual number of withdrawals, and the actual-to-expected ratios using the current and proposed rates.

Withdrawals						
Service	Exposures	Expected	Actual	Actual / Expected	Proposed Expected	Actual / Proposed Expected
0	654	85.0	79	93%	78.5	101%
1	571	68.5	62	90%	68.5	90%
2	473	37.8	46	122%	47.3	97%
3	452	36.2	44	122%	45.2	97%
4	375	15.0	24	160%	22.5	107%
5	335	13.4	24	179%	20.1	119%
6-10	1,088	41.2	52	126%	50.6	103%
11-14	970	29.1	26	89%	22.2	117%
>=15	1,872	18.9	13	69%	15.1	86%
Total	6,790	345.1	370	107%	369.9	100%



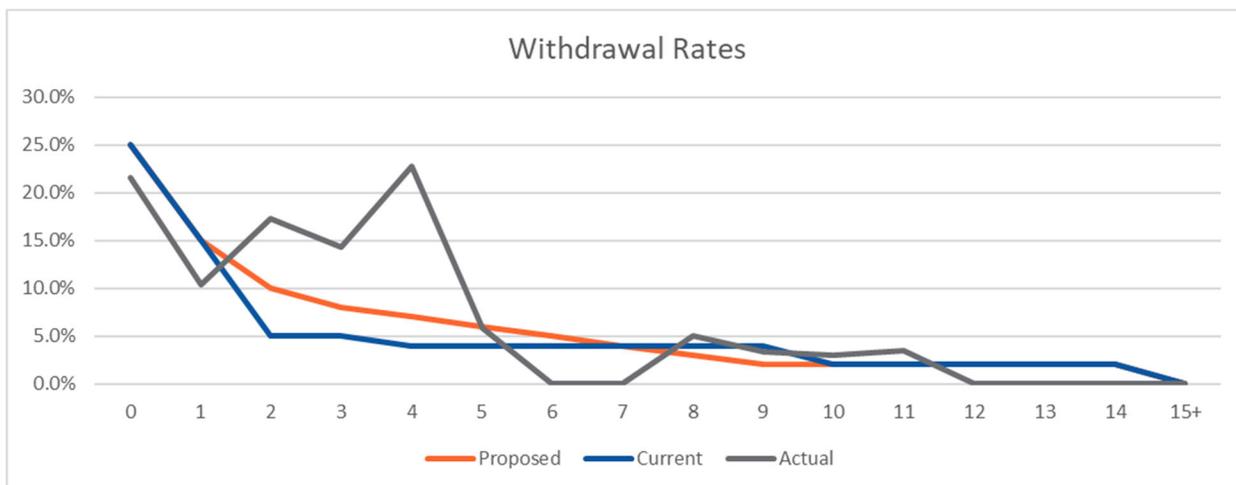
Corrections Employees

Current termination assumptions vary based on service. Over the four years, the plan expected 24.7 withdrawals under the current assumptions and experienced 30. The following table shows the current rates and proposed rates. We recommend increasing rates between 2 and 6 years of service and decreasing rates at 8 and 9 years of service to better capture actual experience.

Service	Current Rate	Proposed Rate
0	25.00%	25.00%
1	15.00%	15.00%
2	5.00%	10.00%
3	5.00%	8.00%
4	4.00%	7.00%
5	4.00%	6.00%
6	4.00%	5.00%
7	4.00%	4.00%
8	4.00%	3.00%
9	4.00%	2.00%
10-14	2.00%	2.00%
>=15	0.00%	0.00%

The following table shows the number of withdrawal exposures, the expected number of withdrawals using the current and proposed rates, the actual number of withdrawals, and the actual-to-expected ratios using the current and proposed rates.

Service	Exposures	Withdrawals				
		Expected	Actual	Actual / Expected	Proposed Expected	Actual / Proposed Expected
0	37	9.3	8	86%	9.3	86%
1	29	4.4	3	69%	4.4	69%
2	29	1.5	5	345%	2.9	172%
3	28	1.4	4	286%	2.2	179%
4	22	0.9	5	568%	1.5	325%
5	17	0.7	1	147%	1.0	98%
6-10	126	4.4	3	69%	3.8	80%
11-14	116	2.3	1	43%	2.3	43%
>=15	123	0.0	0	0%	0.0	0%
Total	527	24.7	30	122%	27.4	110%





Disability Incidence

The plan provides separate benefits for incidences of disability. Therefore, it is appropriate to value these benefits although the incidence of disability retirements is relatively rare.

General Employees

Sample current disability assumptions, which vary based on age, are displayed below. The plan expected 6.83 new disabilities and experienced 3. When we include the experience for the four years in the prior study, the plan expected 13.44 disabilities and experienced 9. We recommend lowering the current disability rates by 15% to better match experience.

Age	Current Rate	Proposed Rate
25	0.0216%	0.0184%
30	0.0242%	0.0206%
35	0.0279%	0.0237%
40	0.0355%	0.0302%
45	0.0477%	0.0405%
50	0.0750%	0.0638%
55	0.1538%	0.1307%

Corrections Employees

Sample current disability assumptions, which vary based on age, are displayed below. The plan expected 1.73 new disabilities and experienced 0. When we include the experience for the four years in the prior study, the plan expected 3.29 disabilities and experienced 2. We recommend no changes to the current rates since the rates are low and not material to the valuation.

Age	Current Rate
25	0.0380%
30	0.0560%
35	0.0646%
40	0.1312%
45	0.1768%
50	0.2776%
55	0.5696%



Beneficiary Demographics

The plan provides survivor benefits to a designated beneficiary. Assumptions are set to properly value these survivor benefits. The current assumptions are 70% of the active population are assumed to have a beneficiary eligible for survivor benefits when valuing the death benefit, with a female beneficiary 3 years younger than a male participant and a male beneficiary 3 years older than a female participant.

We recommend updating the beneficiary percent assumption for all benefits to 65% based on the MetLife 2022 *US Employee Benefit Trends Study*. This study shows that 66% (55% married, 11% single living with partner) of employees surveyed were either married or had domestic partners.

Based on our review of active beneficiary data which is collected for benefit statements, we recommend reducing the difference in average age between participants and their beneficiary from 3 years to 2 years.

Unused Sick Leave

We currently assume the additional service that employees receive credit for at retirement in lieu of unused sick leave adds 1.5% to employees' creditable service for both General Employees and Corrections Employees. We did not have enough data to study this assumption, but based on discussions with the plan sponsor, we will be gathering data to better assess this assumption in future experience studies.

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 other economic assumptions, including the Cost-of-Living Adjustment (COLA), pay improvement, and investment return assumptions. Thus, our economic experience analysis starts with the inflation assumption. The current inflation assumption is 2.50%.

Unlike demographic assumptions where recent past experience is often a good predictor of future experience, economic assumptions, and particularly the investment return and inflation assumptions, typically reflect future expectations more than past experience. In order to review the current assumption, we analyzed inflation from two perspectives:

- Past experience – based on the Consumer Price Index for all Urban Consumers (CPI-U) Baltimore-Columbia-Towson, MD, all items, over the last 10, 20, 30 and 40 years.
- Current expectations of future experience – based on investment experts’ analysis, the Social Security Administration reports, and the Federal Reserve forecasts of future expected inflation.

Past Experience

We reviewed the recent experience in developing our recommendation for the inflation assumption. Presented below are the average annual increases in the CPI-U, Baltimore-Columbia-Towson, MD, over multiple time periods ending with the February 2021 index to follow the same method that is used by the Howard County retirement plans to determine the annual cost of living adjustment.

	Averaging Period			
	10 years	20 years	30 years	40 years
CPI-U Annual Average	2.17%	2.66%	2.45%	2.81%

Experts’ Inflation Expectations

The Howard County retirement plans have retained NEPC as their investment advisor. NEPC updates their 10 and 30-year expected inflation and return assumptions quarterly. As of June 30, 2022, NEPC’s expected 10 and 30-year inflation assumptions are 2.4% and 2.5%, respectively.

We also reviewed an annual survey of investment advisors which includes the inflation assumption built into investment return assumptions. The 2022 edition of the *Horizon Survey of Capital Market Assumptions* (Horizon Survey), which encompasses capital market assumptions from 40 investment advisors, shows an average 10-year future expected inflation rate of 2.46% and a 20-year rate of 2.44%⁴.

The December 2021 inflation forecast of the Federal Reserve Bank was 2.10%. The June 2022 report from the Social Security Trustees indicated a forecast of 2.40%

⁴ When considering all 40 survey respondents. The rates are 2.51% and 2.44%, respectively, when considering only the 24 survey respondents who provided both a 10-year and 20-year inflation expectation.

Recommended Inflation Assumption

The past experience, the average of the expectations of the 40 investment managers represented in the Horizon Survey, and recent Social Security Administration and Federal Reserve expectations are all close to the current inflation assumption. Although recent experience in 2021 and 2022 has seen inflation well over 5.0% (getting to over 8% recently), inflation over the long term has remained relatively steady, supporting a mean reversion hypothesis. Given the long-term nature of the assumption and the unpredictability of short-term inflation, we believe that the 2.50% assumption is supported for the valuations.

We recommend keeping the inflation assumption at 2.50%.

Cost of Living Adjustments

The plan benefit adjusted for COLA is equal to the lesser of (1) the annuity amount increased by the full percentage change in CPI or (2) the initial benefit amount increased by 3% each year since retirement. Hence it is possible for a retiree to receive in one year a COLA of more than 3% as long as the cumulative adjustments from retirement date to present are 3% per year or less. The current COLA assumption is 2.50% and is aligned with the current inflation assumption.

We recommend keeping the COLA assumption at 2.50%.

Investment Return / Discount Rate

The single assumption that has the largest effect on the determination of plan liabilities, funding levels and actuarially determined contributions (ADCs) is the investment return / discount rate assumption. This is not only an assumption about future expected returns on plan assets but also generally is the basis for setting the discount rate used to measure pension plan liabilities. The County sets this assumption, and it is the actuary's duty to provide information to the County to help set all assumptions. Actuaries are also required to comply with Actuarial Standards of Practice No. 27 *Selection of Economic Assumptions for Measuring Pension Obligations* (ASOP 27) when setting the investment return / discount rate assumption that they recommend and use for the actuarial reports. The County currently uses a 7.25% long term assumed rate of return.

Investment advisor expectations

The most common way to set this assumption is to look at the investment mix and expected future returns. We have used information provided by the Plan's investment advisor, NEPC, as well as the Horizon Survey.

NEPC provided us with their expected 10 and 30-year returns using their June 30, 2022 capital market assumptions. The returns include inflation rates for the 10-year and 30-year returns of 2.4% and 2.5%, respectively. As shown on the exhibit below, NEPC's range is a 10-year expected geometric return of 7.1% and a 30-year expected geometric return of 7.7%. NEPC noted the expected returns as of June 30, 2022 are higher than those presented to the Committees at the January 27, 2022 meeting which used their December 31, 2021 capital market assumptions (the 10-year and 30-year rates were 5.7% and 6.9%, respectively). The current 7.25% assumption is within the June 30, 2022 range.



HOWARD COUNTY POLICY REVIEW

JUNE 30, 2022 CAPITAL MARKET ASSUMPTIONS

Asset Classes	Policy Index
US Large-Cap Equity	22%
US Small/Mid-Cap Equity	5.5%
Non-US Developed Equity	11%
Emerging Market Equity	6.5%
Private Equity	13%
Total Equity	58%
US TIPS	2%
US Aggregate Bond	4.5%
10 Year US Treasury Bond	4.5%
US High Yield Corporate/Leveraged Loan	4%
Emerging Market Local Currency Debt	4%
Absolute Return Fixed Income	4%
Private Debt	5%
Total Fixed Income	28%
Real Estate - Core	2%
Real Estate - Non-Core	2%
Private Real Assets (Natural Resources/Infrastructure)	2%
Total Real Assets	6%
Hedge Fund	8%
Total Multi Asset	8%
Expected Return 10 yrs	7.1%
Expected Return 30 yrs	7.7%
Standard Dev	13.6%

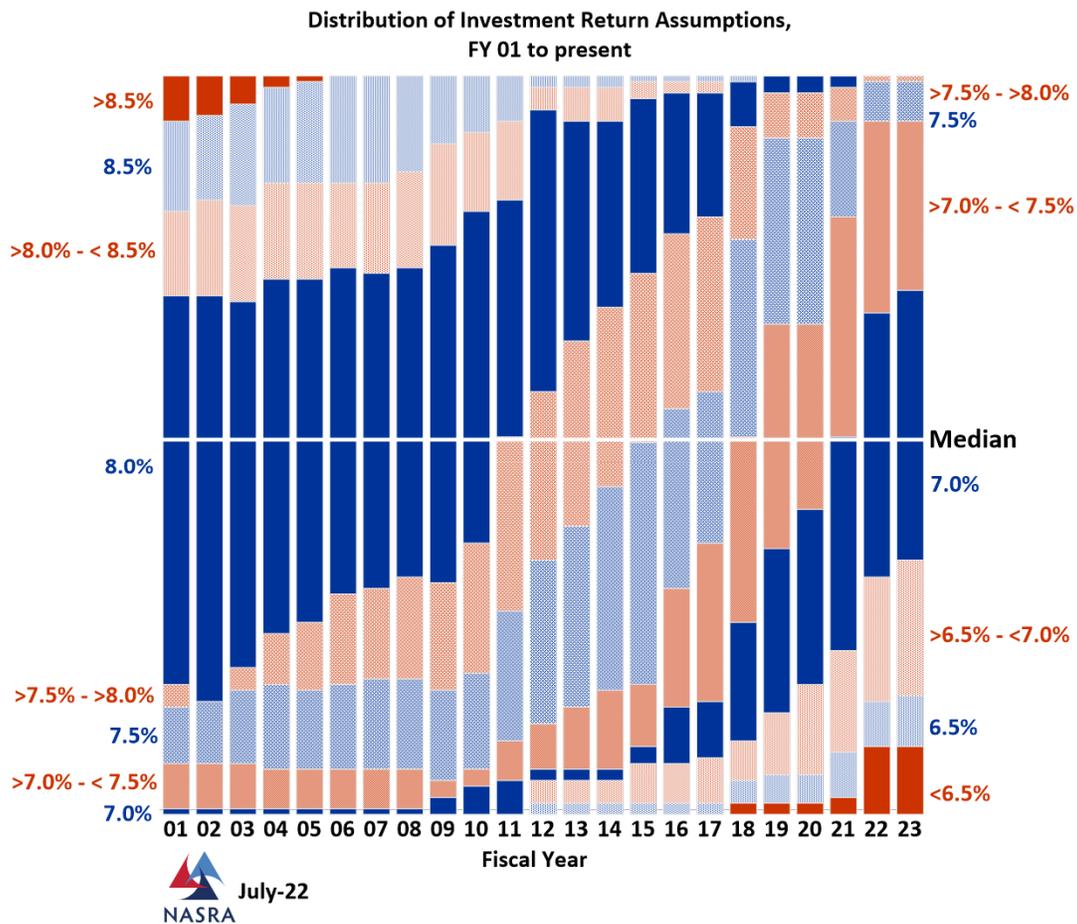


NEPC's Capital Market Assumptions as of June 30, 2022

We also reviewed the investment policy and analyzed expected returns of the current aggregate investment mix of the plan using the August 2022 Horizon Survey capital market assumptions. Based on this analysis, a reasonable discount rate might fall in the range of 5.88% to 7.98%. The expected geometric return is 6.93%. The Horizon Survey notes that “While interest rates have risen in recent months, these increases are not fully reflected in this survey given most of the effective dates of the assumptions were on or around January 1, 2022.” See the Appendix for additional details on the development of the range and the return.

NASRA

As a comparator, we present the NASRA survey (published in July 2022) of discount rates shown below. There is a clear trend to lower nominal investment return assumptions across the NASRA universe over the last 10 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.



Recommended Investment/Discount Rate Assumption

The current 7.25% assumption is supported by the forward-looking expected returns of the plan’s target investment categories and investment allocation outlined in the plan’s investment policy.

We recommend the Retirement Committee and the County continue to review this assumption annually.

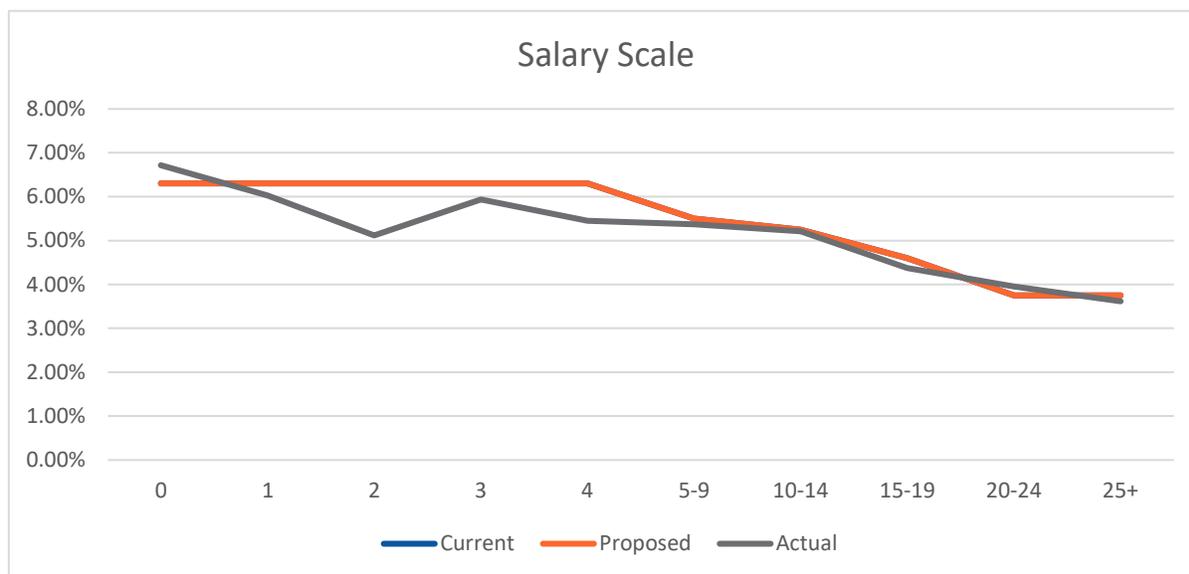
Pay Increases

All plan benefits are based in part on the wages received by the plan members. This makes the level of future pay an important consideration in valuing plan liabilities. The current pay increase assumption is based on service. Generally, larger annual percentage increases in pay occur early in a career, followed by smaller percentage increases in later years.

General Employees

The analysis below summarizes the pay increases for General Employees over the years ending June 30, 2018 through 2021. General Employee positions received across the board (not including merit, or step, increases) salary adjustments of 2% in each of FY2018 to FY2021. Even though annual increases can vary greatly based on the economy, actual salary increases were fairly aligned with expectation (at various levels of service and on average), and we are not aware of any planned increases outside of the historical norm. As such, we do not recommend making any changes to the pay increase assumption. The graph following the table illustrates the actual average pay increases and expected pay increases.

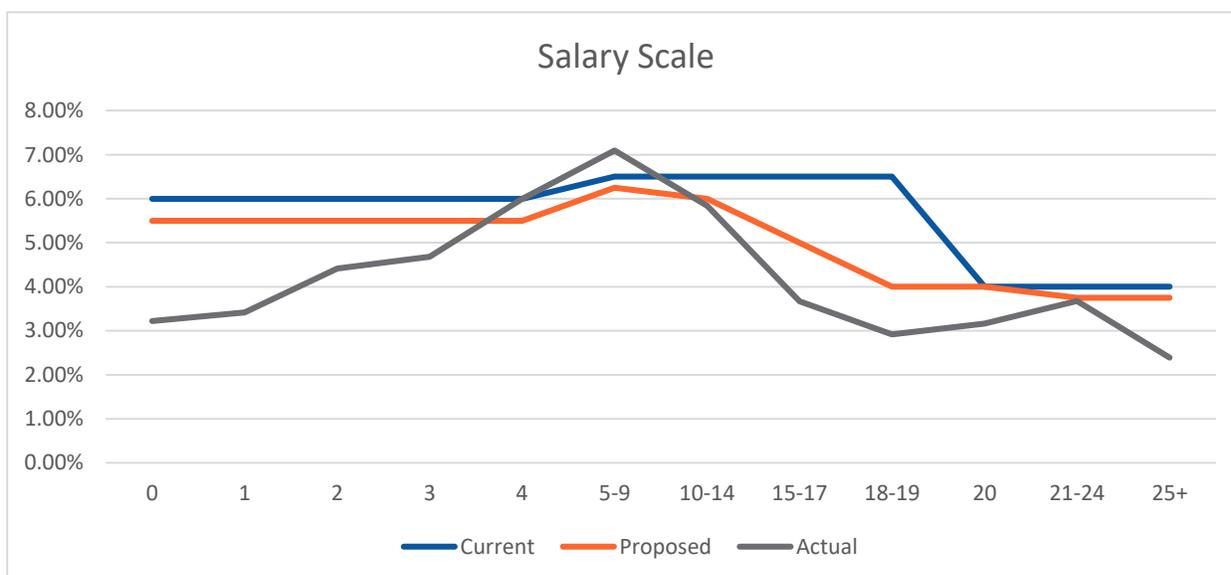
Pay Increases					
Service	Expected from Current	Actual	Actual / Expected	Expected from Proposed	Actual / Expected (Proposed Rates)
0-1	6.30%	6.39%	101%	6.30%	101%
2-4	6.30%	5.50%	87%	6.30%	87%
5-9	5.50%	5.37%	98%	5.50%	98%
10-14	5.25%	5.21%	99%	5.25%	99%
15-19	4.60%	4.37%	95%	4.60%	95%
20-24	3.75%	3.96%	106%	3.75%	106%
25+	3.75%	3.61%	96%	3.75%	96%
Weighted Average	5.36%	5.16%	96%	5.36%	96%



Corrections Employees

The analysis below summarizes the pay increases for Corrections Employees over the years ending June 30, 2018 through 2021. Corrections Employee positions received across the board (not including merit, or step, increases) salary adjustments of 2% in each of FY2018 to FY2021. The pay increases have been slightly less than expected and have varied more by service than the current assumptions had predicted. We recommend reflecting this trend of slightly lower increases by reducing the rates by varying amounts for different years of service. The graph following the table illustrates the actual average pay increases and expected pay increases.

Pay Increases					
Service	Expected from Current	Actual	Actual / Expected	Expected from Proposed	Actual / Expected (Proposed Rates)
0-1	6.00%	3.31%	55%	5.50%	60%
2-4	6.00%	4.93%	82%	5.50%	90%
5-9	6.50%	7.09%	109%	6.25%	113%
10-14	6.50%	5.84%	90%	6.00%	97%
15-17	6.50%	3.67%	56%	5.00%	73%
18-19	6.50%	2.92%	45%	4.00%	73%
20	4.00%	3.16%	79%	4.00%	79%
21-24	4.00%	3.68%	92%	3.75%	98%
25+	4.00%	2.39%	60%	3.75%	64%
Weighted Average	6.23%	5.13%	82%	5.58%	92%





Overall Payroll Growth Assumption

The current assumption is that total payroll will grow by 2.75% per year. The payroll growth assumption is used to (1) amortize unfunded liability bases such that the payment of each base remains as a consistent percentage of expected payroll over the amortization period, and (2) project the payroll to determine the County contribution as a percentage of future expected payroll. Generally, the lower the payroll growth assumption, the more conservative the assumption (i.e., lower assumed payroll growth results in higher amortization amounts in dollars and a higher County contribution as a percentage of expected payroll). If actual future payroll increases exceed 2.75%, the higher County contribution percentage will be applied to the higher actual payroll, and thus, larger contributions will be deposited into the trust to better fund the plan.

Recent experience is that payroll for General and Corrections Employees has increased about 3.6% annually over the last four years; however, over that time period, headcount has also increased. Per participant payroll has increased by 2.9% annually over the last four years. The number of covered positions has flattened out, so we consider both the per participant payroll increase as well as the total payroll increase. We recommend retaining the current assumption that payroll will grow at 2.75% annually but will monitor the increases annually.

General/Corrections Employees	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021	4-year average
Total Payroll	117,741,696	121,237,999	124,898,835	131,560,407	135,730,498	
Increase in total payroll		3.0%	3.0%	5.3%	3.2%	3.6%
Number of active participants	1,803	1,816	1,833	1,869	1,854	
Payroll per participant	65,303	66,761	68,139	70,391	73,210	
Increase in per participant payroll pay rates as of July 1		2.2%	2.1%	3.3%	4.0%	2.9%

Non-Investment Expenses

Total non-investment expenses for the fiscal year are assumed to be the average of the non-investment expenses for the prior two years increased with the assumed payroll growth and rounded to the nearest \$1,000. We do not recommend any change to this assumption.

Section V. Actuarial Methods and Assumptions

Valuation Cost Method / Cost Allocation Procedure

The Plan's valuations are completed using the projected unit credit (PUC) cost method. This method is considered an acceptable practice in the Conference of Consulting Actuaries (CCA) White Paper on Actuarial Funding Policies and Practices for Public Pension Plans⁵. The method produces a reasonably level cost with respect to payroll when the plan population's average age and service remain similar from year to year. This method has fit well with the County's budgeting process for many years, and we currently recommend no change. In the next experience study, or even in the interim, we recommend a study to consider changing to the entry age normal (EAN) cost method. The EAN cost method is more common for public sector plans, is required for GASB, and is designed to produce contributions which are a level percentage of payroll over a members working career.

Asset Smoothing Method

The intention of an asset smoothing methodology is to dampen the initial impact of investment market fluctuations on plan costs by spreading them over a number of years. The plan uses a five-year smoothing period for recognizing returns on the market value of assets that are over or under the assumed return. The actuarial value of assets are constrained to be within 50% to 150% of the market value of plan assets. This is deemed model practice in the CCA White Paper. We recommend no changes.

Amortization of Unfunded Actuarial Accrued Liability

Currently, the unfunded actuarial accrued liability (UAAL) is amortized as a level percentage of payroll over the following closed periods

- 15 years for experience gain/loss
- 15 years for assumption and method changes
- Average expected future service for active plan amendments
- No explicit period defined for inactive plan amendments
- 5 or fewer years for early retirement incentives
- Surplus, when reached, over 30 years

The layered amortization approach used by the Plan is the CCA White Paper model practice for amortizing any unfunded liabilities. Additionally, the amortization periods also generally conform to model practice, except for plan amendments. We recommend that plan amendments that impact active members be amortized over the *lesser of 15 years and the average expected future service*. Also, we recommend adding that plan amendments that impact inactive members be amortized over the *lesser of the average life expectancy and 10 years*.

Actuarial Equivalent Definition

This study is about assumptions used to fund the plan and not about benefit levels. However, actuarial assumptions are also used to determine benefits as described in the *Actuarial Equivalent* definition of the plan. The most common use is to reduce benefits when a retiring member elects to provide additional survivor benefits. These reductions factor in the ages of the member and beneficiary and must use certain assumptions about mortality, investment returns and cost of living adjustment.

⁵ The CCA White Paper is available at https://www.cactuaries.org/docs/default-source/papers/cca-ppc_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf?sfvrsn=6397cc76_6,



In recent years, participants in a number of ERISA plans have filed lawsuits against plans claiming that their benefit were determined using outdated mortality tables and hence their benefit should be increased based on more recent mortality tables. ERISA has a variety of rules that do not apply to governmental plans. However, Maryland law imposes ERISA fiduciary standards on local government pension plans. Litigation risk with public plans in this area is much less. However, updates should be considered from time-to-time.

An analysis of the plan's *Actuarial Equivalent* assumptions are not part of the scope of work for this study; however, the Retirement Committee and/or the County may ask Bolton to prepare a separate study to review the *Actuarial Equivalent* assumptions.



Section VI. Impact of Changes

The results below reflect the impact of the proposed changes on the July 1, 2021 valuation results used for the Actuarially Determined Contribution (ADC) for FY2023. Note, however, that if changes to the assumptions are adopted, they would first be reflected in the July 1, 2022 valuation which will develop the ADC for FY2024.

	Current Assumptions	Proposed Assumptions	Change	Change (% of Current)
Actuarial Accrued Liability	\$557,115,711	\$557,997,390	\$881,679	0.2%
Actuarial Value of Assets	\$560,095,647	\$560,095,647	\$0	0.0%
Unfunded Liability	\$(2,979,936)	\$(2,098,257)	\$881,679	-29.6%
AVA Funded Ratio	100.5%	100.4%	-0.1%	-0.1%
ADC	\$13,851,158	\$13,706,459	\$(144,699)	-1.0%
ADC as Percent of Payroll	9.7%	9.6%	-0.1%	-1.0%

In the table above, the dollar change in Actuarial Accrued Liability is amortized over 30 years since the plan was in a surplus position as of July 1, 2021. If the plan had instead been underfunded, the change in the ADC would have been \$(119,689) instead of \$(144,699). The ADC as a percent of payroll would have remained at 9.6%.



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

We used participant data initially prepared for the actuarial valuations for the years beginning:

- July 1, 2017
- July 1, 2018
- July 1, 2019
- July 1, 2020
- July 1, 2021

The data files were provided by or at the direction of Howard County. We have relied on this information for purposes of preparing this report. We have not audited the census data provided, however based on our review the data appears to be reasonable and consistent. Unless otherwise noted in our report, we believe the information provided is sufficiently complete and reliable for purposes of the analysis presented in this report.

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



Appendix

As an independent review of this assumption, we used the Capital Market Assumptions (CMAs) provided in Horizon Actuarial Services' *Survey of Capital Market Assumptions – 2022 Edition* to develop an expected portfolio geometric return based on the June 30, 2022 asset allocation.

The table below summarizes Horizon's CMAs and our derivation of the portfolio return for the Howard County Retirement Plan. In our calculations, to convert between the portfolio arithmetic (A) and geometric (G) return, we used the formula $G \approx A - V/2$, where V is the portfolio variance.

Horizon Asset Class	6/30/2022 Allocation	Arithmetic Return		St. Dev
		10-Year Real Return (net of inflation)	20-Year Real Return (net of inflation)	
US Equity - Large Cap	22.0%	4.70%	5.37%	16.33%
US Equity - Small/Mid Cap	5.5%	6.04%	6.53%	20.34%
Non-US Equity - Developed	11.0%	5.61%	6.22%	18.09%
Non-US Equity - Emerging	6.5%	7.52%	8.22%	23.92%
US Corp Bonds - Core	4.5%	0.31%	1.20%	5.36%
US Corp Bonds - High Yield	4.0%	2.00%	2.98%	9.90%
Non-US Debt – Developed	4.0%	-0.39%	0.32%	7.51%
Non-US Debt – Emerging	4.0%	2.77%	3.43%	10.92%
TIPS	6.5%	-0.30%	0.39%	5.79%
Real Estate	4.0%	4.33%	4.87%	17.00%
Hedge Funds	8.0%	2.67%	3.39%	7.99%
Commodities	2.0%	2.84%	3.41%	17.78%
Private Equity	13.0%	9.13%	10.05%	22.13%
Private Debt	5.0%	5.09%	5.38%	11.49%
Total	100.00%			
Portfolio Arithmetic Return (net of inflation)		4.53%	5.22%	
Inflation		2.47%	2.45%	
Portfolio Arithmetic Return (including inflation)		7.00%	7.67%	
Portfolio Variance				1.48%
Portfolio Standard Deviation				12.2%
Portfolio Geometric Return (net of investment expenses)		6.26%	6.93%	

Using the calculated portfolio standard deviation of 12.2%, we estimated the 5th, 35th, 50th, 65th, and 95th percentiles for the portfolio geometric return for both the 10-year and 20-year investment horizons. The graph below illustrates the ranges of returns.



	20-Year	10-Year
95th	11.40%	12.59%
65th	7.98%	7.74%
50th	6.93%	6.26%
35th	5.88%	4.77%
5th	2.45%	-0.07%

Some plan sponsors prefer a more conservative assumption for their funding valuations since contribution requirements increase following years in which investment returns do not meet the assumption. As such, they set the discount rate assumption lower than the expected investment return to increase the probability that the fund's return will meet or exceed the discount rate. From a fiduciary standpoint, the number one goal of a pension system is to adequately and systematically fund the plan to ensure that promised benefits can be paid in full. Achieving this goal often entails the consideration of supporting, and sometimes competing, objectives, such as mitigating undo pressure on the sponsor, participants, or other stakeholders and balancing contribution development and volatility with intergenerational equity.