VRS Stress Test and Sensitivity Analysis

Report to the General Assembly of Virginia

June 2026

Contents

Stress Test and Sensitivity Mandate

In accordance with § 51.1-124.30:1 of the Code of Virginia, VRS has adopted a policy to regularly report sensitivity and stress testing analyses for members of the General Assembly. (Appendix). The analyses shall include projections of benefit levels, pension costs, liabilities and debt reduction under various economic and investment scenarios.

Stress testing, also known as scenario testing, is an analysis or simulation designed to measure the effect on the plans of various projected, generally adverse, investment and actuarial events.

Sensitivity testing examines the effect on the plan of different actuarial assumptions and methods.

This report provides an analysis of the potential impact of various scenarios and hypothetical situations on VRS-administered retirement plans and supports transparency with regard to the future health of the retirement system.

It should be noted that when VRS examines future potential outcomes for the plans, probabilities exist for both positive and negative scenarios. This report focuses primarily on the negative scenarios as they help to identify those areas of risk that generally provide the most challenges to plan sponsors.

In addition to the mandate set forth in the *Code of Virginia* above, the Actuarial Standards Board requires actuaries to perform assessments of risk through Actuarial Standard of Practice No. 51: "Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions". The annual funding valuation reports include risk and plan maturity measures, discount rate sensitivity, as well as deterministic projections of contribution rates including asset return sensitivity. The risk analysis herein complements and enhances the risk measures shown in VRS' annual funding actuarial reports which can be found on the VRS website at the link below.

Virginia Retirement System Actuarial Valuation as of June 30, 2025

Executive Summary

The purpose of this report is to assist the VRS Board of Trustees, the Virginia General Assembly, the Governor, stakeholders, and the public to better understand and assess the risks inherent in the funding of VRS-administered post-retirement benefits. This year's report investigates various possible risks faced by VRS and analyzes their potential impact on the benefit programs.

The analysis in this report is based on the results of the June 30, 2025 actuarial valuation which was used for rate-setting for fiscal years 2027 and 2028. The 2025 valuation also included updates to actuarial assumptions based on the quadrennial experience study which included experience from fiscal years 2021-2024.

To better understand the risks associated with funding the System, this report examines a range of potential outcomes that could endanger the long-term funding of the System and prevent the System from reaching full funding. Again, this report focuses primarily on analyzing negative outcomes, since such outcomes would result in the greatest challenges for the plan sponsors and System.

Key results and findings of this report:

- Consecutive years of higher than assumed rates of return have lowered employer contribution rates and improved the funded status of both the retirement and Other Post-Employment Benefits (OPEB) plans.

- Recent uncertainty in the markets highlights the need to explore opportunities to further strengthen the health of the plans.
    - Markets started strong in fiscal year 2026, but as of this writing geopolitical uncertainty is creating volatility in the markets.
    - Uncertainty also exists related to a variety of causes, including tariffs, inflation concerns, lower net immigration, and the potential for an AI bubble.

- Cash flow requirements across all benefit plans are expected to trend higher over the next ten years as more members are expected to retire and employer contributions are expected to trend lower as new members are enrolled in the hybrid retirement plan which is a lower cost tier for employers.
- Analysis suggests that accelerating the payback of the legacy unfunded liabilities could provide significant long-term savings and better position the statewide plans

to weather future volatility in investment returns, thereby serving to reduce investment risk.

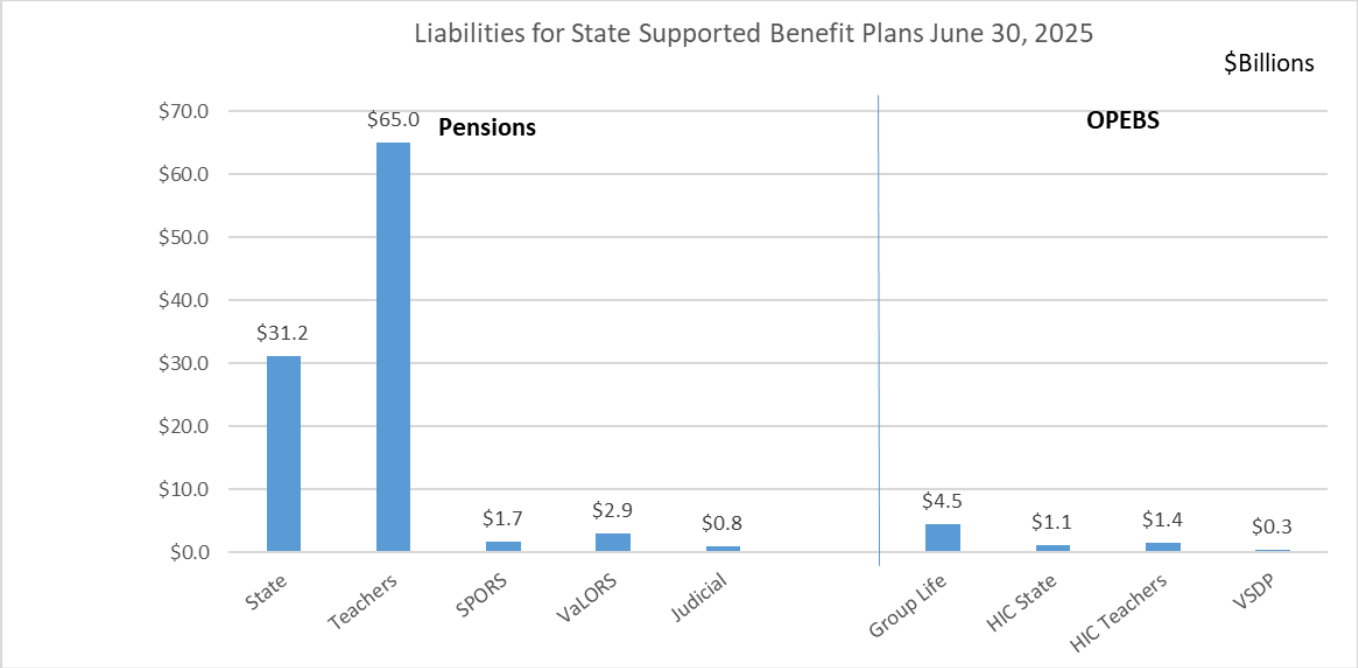
    - Shortening amortization periods or maintaining higher prior employer contribution rates provides long-term savings by reducing interest paid on outstanding balances.

- As plan health has improved, legislative proposals looking to expand benefits have begun to increase. Expansion of benefits across pension and OPEBs without corresponding immediate funding to cover the increases in liabilities is not recommended, especially while plans remain funded below 100%.

VRS OVERVIEW

VRS administers both pension plans and other post-employment benefit plans (OPEBs) such as Group Life, Health Insurance Credit plans, and Managed Disability plans. While this report will mainly focus on the impacts to the pension plans, the magnitude and direction of the impacts discussed herein would have similar impacts on the VRS administered OPEBs. Due to the level and type of benefits provided, the liabilities associated with the OPEB plans are not nearly as large as those associated with the pension plans. Below is a comparison of the accrued liabilities as of June 30, 2025 for several of the statewide plans.

Exhibit 1



Statewide Retirement Plans

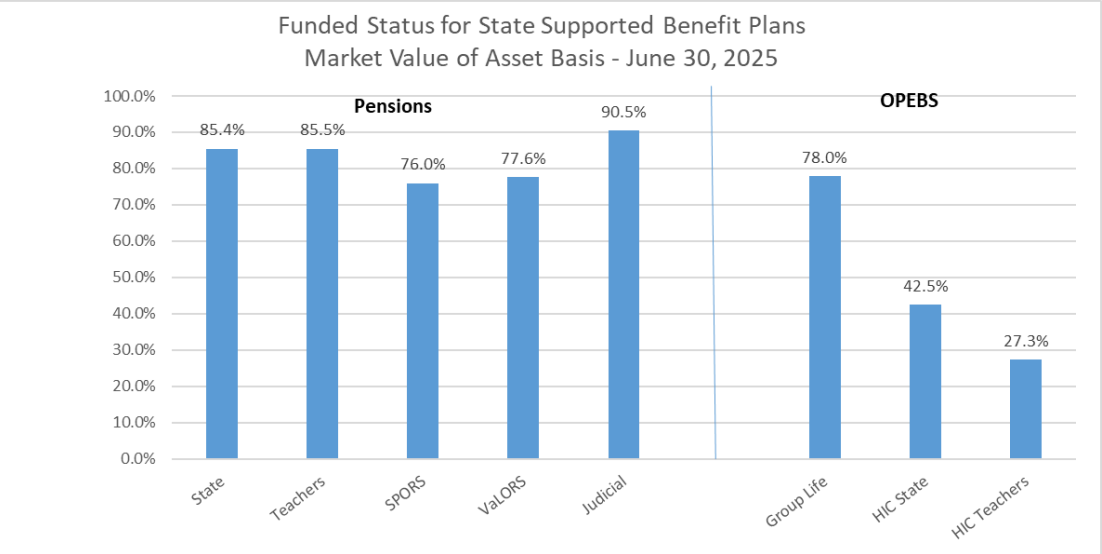
Plan	Employee Group Covered
State	State Employees
Teachers	Teachers and Administrative Staff
SPORS	State Police Officers
VaLORS	Virginia Law Enforcement Officers
Judicial	Judges

Statewide Other Post Employment Benefit Plans (OPEBs)

Plan	Employee Group Covered
Group Life	Group Life Insurance
HIC State	Health Insurance Credit for State, SPORS, VaLORS, and Judicial plan members
HIC Teachers	Health Insurance Credit for members of Teacher Retirement Plan
VSDP	Virginia Sickness and Disability Program for State, SPORS and VaLORS plan members (Managed Disability Program)

With respect to plan funding levels, it should be noted that the statewide OPEB plans are generally less well-funded than the pension plans because prefunding of OPEB plans didn't become formalized until implementation of GASB 45 in 2007/2008, Because of the lower asset values, investment losses would be slightly less impactful to the OPEB plans.

Exhibit 2



* Virginia Sickness & Disability Program (VSDP) currently has a funding surplus.

Future Risk Analysis

Investment Rate of Return Assumption

Pension plans are generally pre-funded, meaning money is invested during a member's career so that by the time the member retires adequate funds will exist to pay benefits throughout the member's retirement. Investment earnings on plan contributions currently account for nearly two-thirds of pension benefit payment funding. The discount rate – the rate used to determine the present value of future benefit payments – influences the level of contributions required, assuming they (in combination with invested assets) will generate investment income throughout a member's career and into retirement. VRS uses the assumed long-term rate of return as the plan discount rate, and these terms are used interchangeably in this report.

The discount rate reflects expectations of what investment earnings the markets will deliver in the future, and it is calculated based on two components: expected price inflation and real rate of return[1]. A change in either of those components over the long term would necessitate further evaluation of the discount rate.

Funding long-term health requires careful management and decision making for the asset allocation needed to fund members' pensions and OPEBs, such as group life insurance and the health insurance credit, over the long term. The VRS Board of Trustees conducted an Asset Liability Modeling Study (ALM) in August 2025 to ensure prudent and responsible investment practices and strategies are being used in recommending and deploying investment allocations.

As part of the ALM, the VRS investment team updated their capital market outlooks. Since the discount rate is a long-term assumption, VRS focuses on the 20-year outlook, but also considers shorter-term market expectations. The exhibit below shows the target weights of each asset class along with the expected return and corresponding volatilities from 2024 and 2025.

[1] The Real Rate of Return *measures the percentage return earned on an investment after adjusting for the inflation rate*, unlike the nominal rate. The nominal rate of return is the amount of money generated by an investment before factoring in expenses such as investment fees and inflation. If an investment generated a 10% return, the nominal rate would equal 10%. After factoring in inflation during the investment period, the actual "real" return would likely be lower.

Exhibit 3

Target Allocation

	2025			2024		
Asset Class	**Wt.**	**Exp.Ret**	**Exp.Vol**	**Wt.**	**Exp.Ret**	**Exp.Vol**
Public Equity	32.0%	6.6%	15.5%	33.0%	6.7%	16.2%
Private Equity	16.0%	8.6%	22.4%	16.0%	8.7%	22.5%
Real Assets	14.0%	7.1%	10.2%	14.0%	7.2%	10.5%
Credit Strategies	16.0%	8.2%	6.3%	14.0%	8.1%	6.9%
Diversifying Strategies	5.0%	6.8%	4.2%	4.0%	5.8%	4.6%
Private Investment Partnerships	2.0%	7.9%	16.1%	2.0%	8.0%	16.6%
Fixed Income	16.0%	5.1%	5.4%	16.0%	5.4%	5.7%
Cash	2.0%	4.1%	0.1%	2.0%	3.0%	0.1%
Leverage	-3.0%	4.6%	0.1%	-1.0%	3.5%	0.1%
Total Fund		**7.1%**	**10.5%**		**7.1%**	**11.0%**

Due to the divergence between expected returns over the near term, i.e., the next five to 10 years, and over the longer term, i.e., 20 to 30 years, reflecting a blended discount rate to incorporate near-term uncertainty in the markets requires selecting a discount rate below the median expected long-term rate of return. As displayed in Exhibit 3 above, while the median return of 7.1% is expected to be achieved 50% of the time, selecting a discount rate of 6.75% would move the assumption closer to the 45th percentile, providing approximately a 55% chance of achieving the long-term rate of return over time.

In June 2023, the VRS Board selected and approved a new long-term strategic asset allocation which has been phased in since 2023. The new strategic allocation is still expected to provide a median return of 7.1% but with lower volatility.

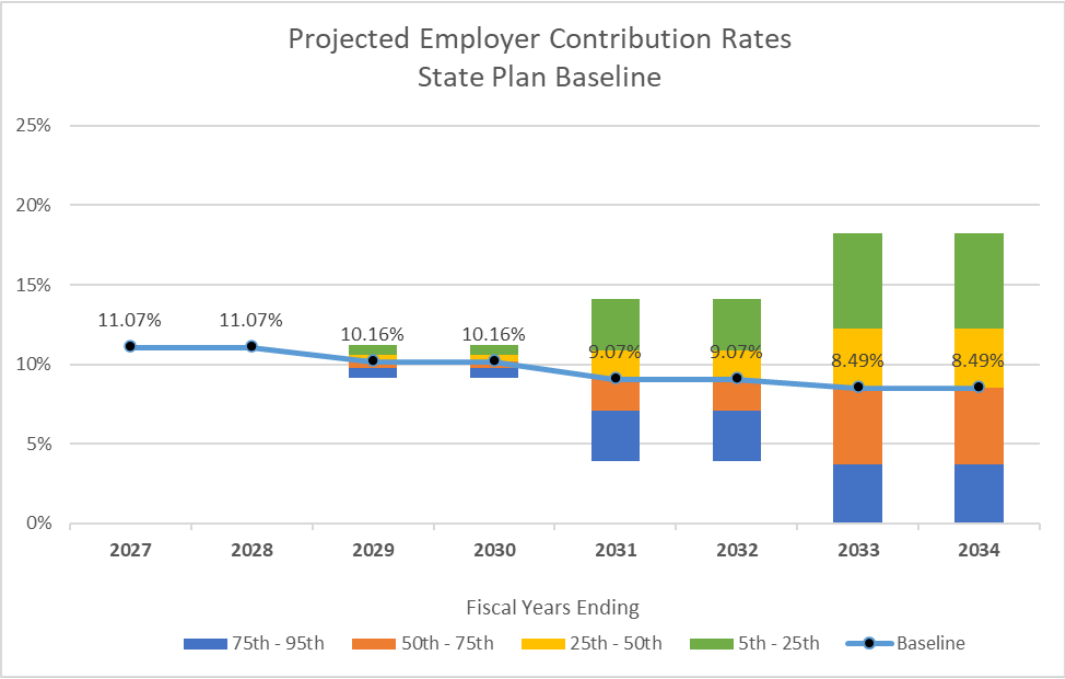
Investment Risk

Possible Future Outcomes

Investment returns will have a greater impact on the funding of the plans as the VRS plans continue to mature. When investment returns are below expectations, the unfunded actuarial accrued liability increases and additional contributions are needed, which historically have been funded by employers. If investment returns meet expectations, employer contributions will decrease over time as new members join the lower cost Hybrid Retirement Plan and payments are made towards the unfunded liability.

Using the State plan as an example, exhibit 4 shows probabilistic or stochastic projections of future investment returns and the impact on future contribution rates for the State plan. Stochastic analysis reflects the realistic view that pension plan investment returns, like the market itself, may be volatile and uncertain. Rather than using exact assumptions, the model uses probability distributions to provide a range of possible results based on these probabilities. These stochastic projections are based on VRS' 2025 capital market outlook and target asset allocation. Under the "baseline" scenario, the State plan employer contribution rates are expected to trend lower, with a 50% probability that employer contribution rates will be between 3.69% and 12.26% by fiscal year 2033, and an expected employer rate of 8.49%.

Exhibit 4 – Stochastic Basis

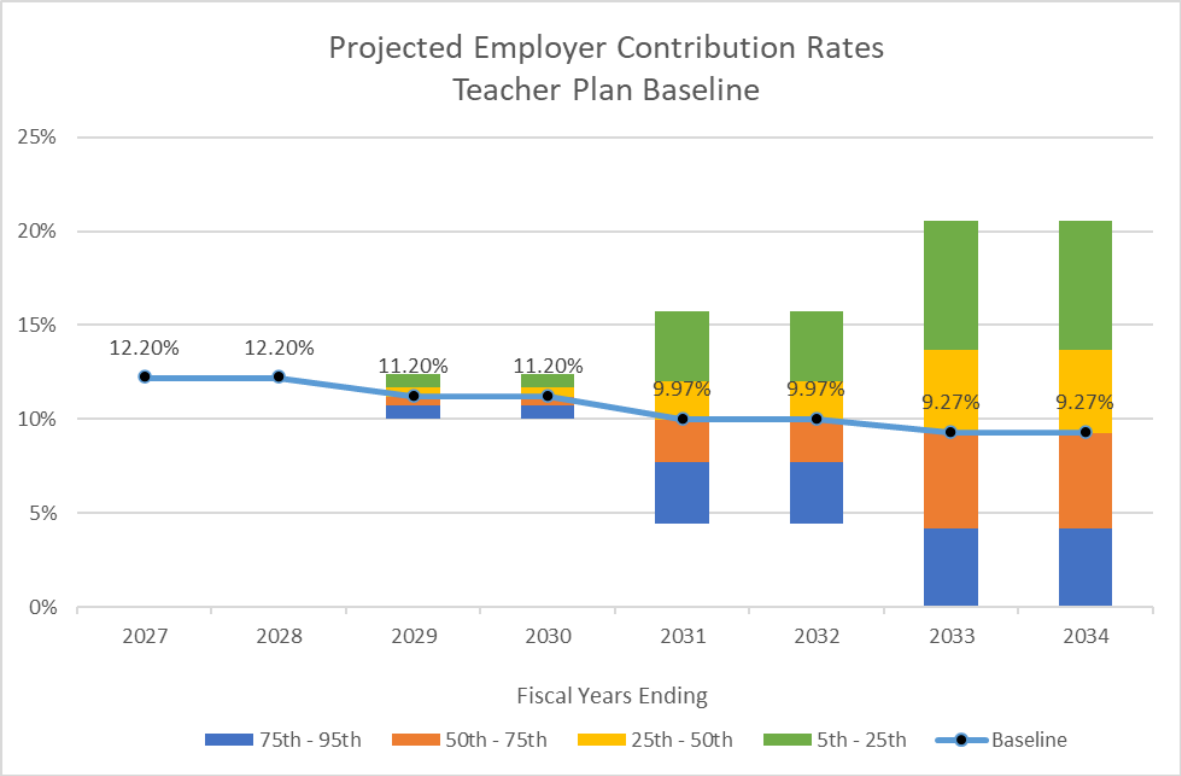


Results based on June 30, 2025 actuarial valuation and estimated 6.75% fiscal year 2026 fund return.

The 20-year capital market assumptions will be the "baseline" scenario used in the scenario testing that follows later in the report.

Exhibit 5 shows the probabilistic or stochastic projections of future investment returns and the impact on future contribution rates for the Teacher plan. The Teacher plan employer rates are also expected to trend lower, with a 50% probability that by fiscal year 2033 employer rates will be between 4.16% and 13.66%, and an expected contribution rate of 9.27%.

Exhibit 5 – Stochastic Basis



Results based on June 30, 2025 actuarial valuation and estimated 6.75% fiscal year 2026 fund return.

Scenario Testing (Unexpected or Unpredictable Economic Events)

Fiscal years 2024 and 2025 saw growth in the markets resulting in a 9.90% fund return in each year following the years of volatile markets in the wake of the COVID-19 pandemic. Markets started strong in fiscal year 2026, but as of this writing geopolitical uncertainty is creating volatility in the markets. In addition, uncertainty exists related to tariffs, lower net immigration, and the potential for a tech bubble related to Artificial Intelligience (AI).

The VRS investment team compiled four economic scenarios that provide framing of global economic outcomes that could possibly occur over the next several years. The following four illustrative scenarios are designed to show the potential magnitude of the impacts on plan funding. There is no degree of certainty that any of these scenarios will correctly simulate what will actually occur over the next several years.

Although merely illustrations, the stress testing scenarios help to highlight the vulnerability of the fund to unexpected market shocks and the magnitude by which these scenarios can quickly degrade funded status and accelerate employer contribution requirements. It is important to note that VRS still has considerable legacy unfunded liabilities. As a result, the plans are less prepared to withstand market dips, with poor investment performance potentially widening the gap between promised benefits and available assets.

Especially with significant unfunded liabilities, protecting capital from significant volatility will generally be more prudent and crucial for long-term portfolio growth than chasing high returns. Significant losses can drastically damage long-term performance, making it harder for a portfolio to recover to its previous highs. A pension plan experiencing a 20% investment downturn needs a 25% return to recover to its original value, not 20%. This phenomenon, often called volatility drag or the law of large losses, occurs because the percentage loss is calculated on a larger base amount, while the recovery gain is calculated on a smaller, reduced base. And as investment losses get larger, they will require disproportionately higher gains to recover, making it harder to break even as losses deepen (e.g., a 50% loss would require a 100% gain to recover).

To mitigate this, investors often focus on diversification, proper asset allocation, and managing concentration risks to avoid catastrophic drawdowns.

In the scenarios below, there are two adverse scenarios, a base case, and a favorable scenario. The adverse scenarios are front-loaded, meaning that the impact is modeled to occur over the next several years. Note that the actual fiscal year 2026 return was unavailable at the time this report was produced therefore an estimate of 6.75% was used for illustrative purposes.

- **Baseline** – This scenario assumes annual returns between 7.00% and 8.00% with an expected 20-year return of approximately 7.1%.
- **Secular Stagflation/Tariff Policy -** This is a mixture scenario that combines a period of slowing growth and productivity, with an increasing concentration of wealth exacerbated by restrictive trade policies and tariffs. Global growth slows on tariffs' hit to global trade and supply chains. This scenario does not include the

impact to inflation should the there be a decoupling of the Federal Reserve as an independent agency.

- **Tech Bubble –** This scenario is reminiscent of the surge in share prices on the tech sector during the 1990s. The correction is inevitable and swift with tech sector shares entering a bear market lasting two years.
- **Productivity Boost –** In the final scenario, an increase in productivity across the economy spurred by technological advancements and capital investment help to drive higher real growth. Corporate profitability remains elevated leading to sustained higher valuations and equity returns. Reported earnings continue to exceed expectations. Central banks move to a more neutral stance as productivity gains fuel ongoing growth with muted inflationary impacts given more efficient production. Stability in monetary and trading policies drives a more synchronized global economy with emerging markets benefiting from a calm developed market rate environment and reduced geopolitical tensions.

The VRS scenario testing produces 20 years of 10,000 trials for each given investment scenario. The analysis provided below shows the median cumulative asset returns for the various scenarios.

Asset/Liability modeling is not an exact science, but rather an aid in predicting long-term trends and risk measuring tool. Results should not be viewed on an absolute basis but rather on a relative basis compared to alternative scenarios.

It should be noted that if protracted unfavorable economic experience were to occur, it is likely that plan design changes would be considered to maintain the long-term health of the funds. This was the case following the Great Recession when a series of pension reforms were instituted to lower the employer risk and future costs of the plans.

Exhibit 6 shows the cumulative returns for each of the economic scenarios. As noted above, the estimated return for 2026 was assumed for purposes of this analysis to be 6.75%.

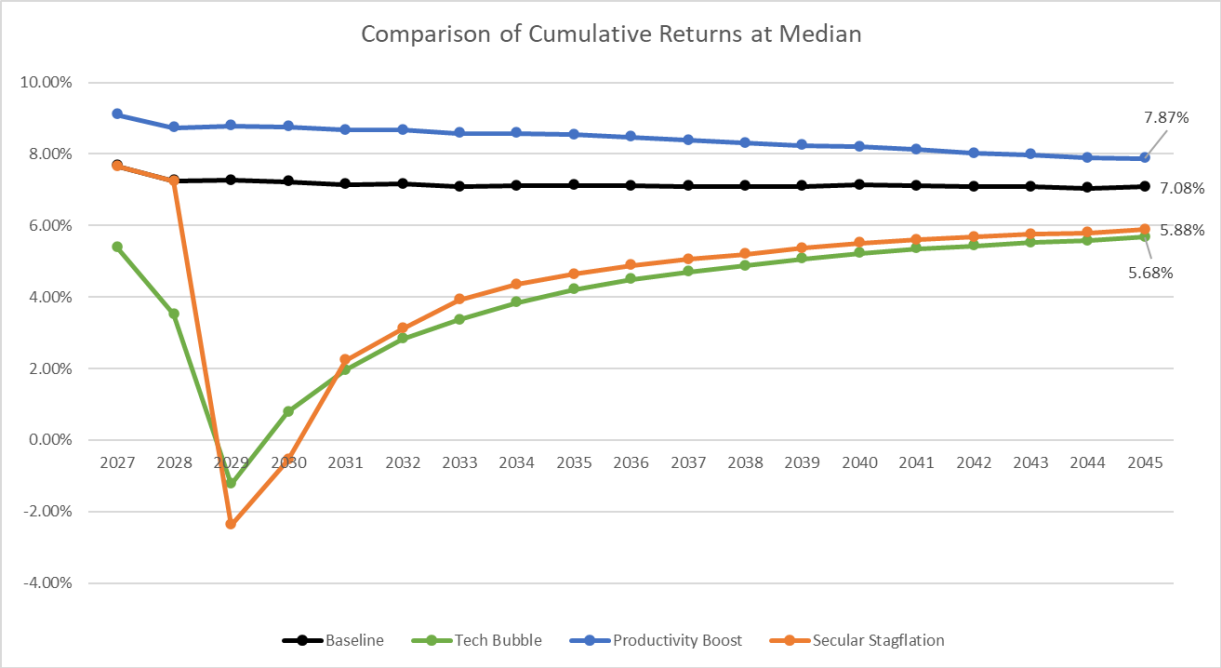
Highlights of Exhibit 6:

- **Secular Stagflation/Tariff Policy** models slightly above average returns for the first two years followed by a large drawdown in year three. Markets are assumed to rebound in years four through seven. Subsequent returns are similar to the baseline scenario.
- **Tech Bubble** models below assumed returns for the first two years followed by a larger drawdown in year three. Subsequent returns are similar to the baseline scenario.

- **Productivity Boost** models higher than assumed returns for the first 10 years before reverting to the baseline.

As expected, Productibity Boost will produce more favorable outcomes than the baseline. Secular Stagflation and Tech Bubble produce poor results in the short-term then rebound, but long-term returns remain below the baseline results. Scenarios depicted tend to focus on poorer outcomes to focus on the downside risk.

Exhibit 6



When analyzing the impacts of the scenario testing we focused on three key measures in this report:

- Employer contribution levels as a percentage of payroll
- Future funded status
- Liquidity or Cash flow needs – defined as benefit payments minus contributions

The analyis shows the impact to the State retirement plan. The impacts on the other statewide retirement systems are very similar to the impacts provided for the State plan.

Employer Contribution Levels

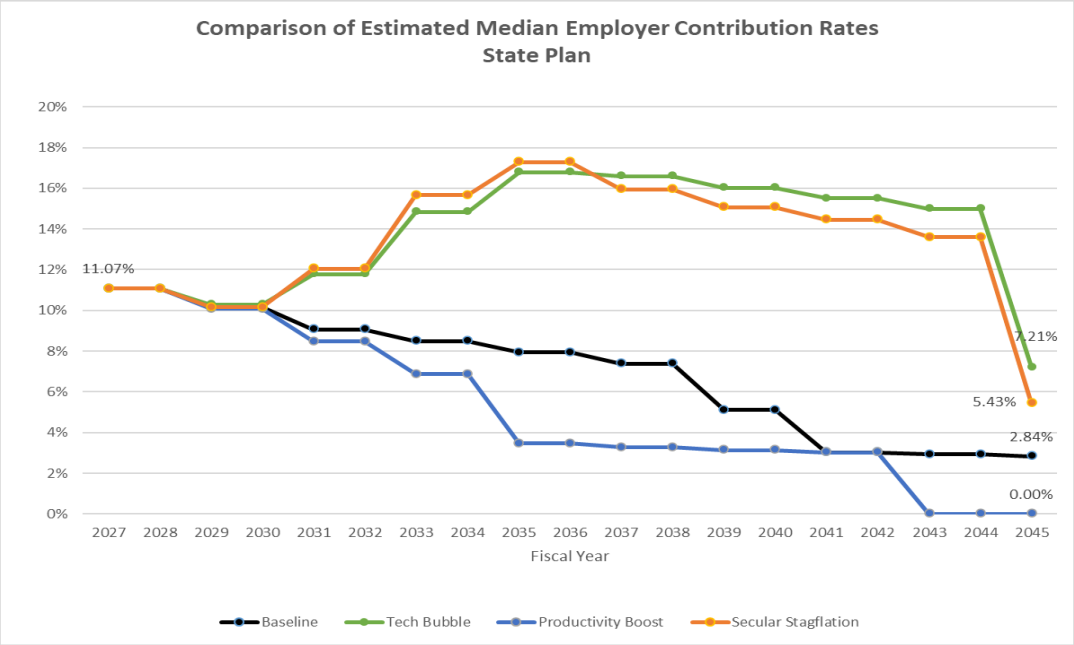
Below are estimated impacts on employer contribution levels for the defined benefit plans under the various economic scenarios. The projections do not include the defined contribution portion of the Hybrid Retirement Plan which is not subject to investment or longevity risk for the employer. Because VRS does rate-setting every two years and has

various risk mitigation tools in play, such as asset-smoothing and 20-year amortization of gains and losses, the contribution impacts are a longer-term risk measure as impacts are blended into the rates over time. These are economic driven impacts which show the effect of adverse investment returns on employer rates over time.

Highlights of Exhibit 7:

- In the baseline scenario contribution rates for the State plan trend lower over the next decade as new members join the lower cost Hybrid Retirement Plan and payments are made towards the unfunded liability without adding additional unfunded liabilities due to investment losses.
- Secular Stagflation and Tech Bubble scenarios include investment returns below the expected rate of return for an extended period of time. The impact on contribution rates is directly in line with the level of fund underperformance relative to the assumed rate of return of 6.75%. Larger drawdowns on the fund require larger increases in employer rates which are blended in over time and then higher rates continue until the unfunded liabilities are paid off over 20 years, which coincides with the established amortization period for actuarial gains and losses in the VRS funding policy.
- Conversely, the Productivity Boost scenario shows the positive impact of higher-than-expected returns, which would lower employer contribution requirements as gains are recognized over time.

Exhibit 7 – State Plan Employer Contribution Rate Impacts



Future Funded Status

Funded status is an important measure of plan health, but it is a bit harder to utilize under these scenarios since the contribution streams differ by scenario, and the study assumes 100% of the required contribution would be funded. Because of this, they become more of a short to mid-term measure of the impacts of the economic scenario.

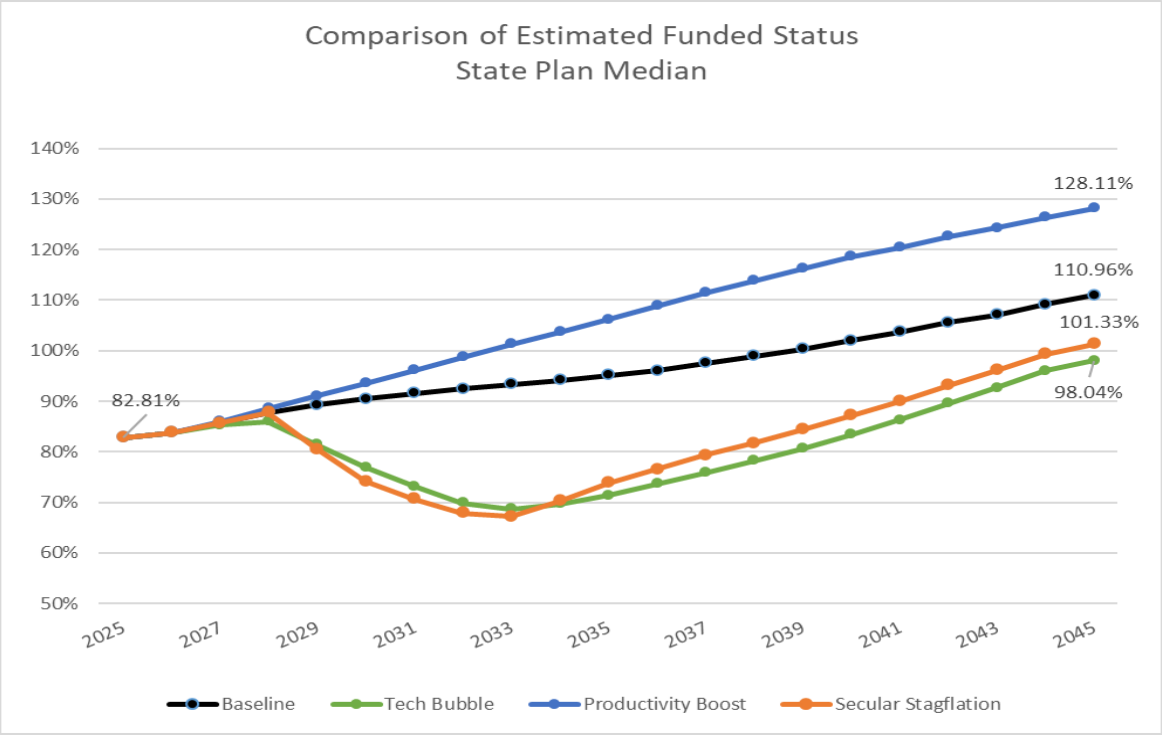
Highlights of Exhibit 8:

The baseline scenario shows a steady increase in funded level as no new unfunded liabilities are generated and legacy unfunded liabilities continue to be paid down.

The productivity Boost scenario anticipates multiple year investment gains, which accelerate funded status improvement.

Secular Stagflation and Tech Bubble scenarios include investment losses, which decrease the plan funded status. This leads to higher employer contributions and ultimately pushes out the time to attaining the 100% funded level due to the additional investment losses early in the scenarios. Large draw downs on the fund will immediately impact funded status and subsequently require larger contributions to pay down the additional unfunded liabilities which are amortized over 20 years.

Exhibit 8



Liquidity / Cash Flow Projections

Defined benefit pension plans are designed to provide employees with a guaranteed income stream upon retirement. Contributions to VRS plans are generally shared by employees and their employers and are a systematic way of prefunding the system's costs. The benefit of prefunding is that investment returns on the prefunded plan assets reduce the employer's long-term contributions.

Retirement plans that have been in operation for a number of years generally have contributions coming into the plan and benefits being paid out. The net (non-investment) cash flow is the difference between the contributions collected (inflows) and the benefits and expenses (outflows) of the fund. These cash flows will vary for each plan because all plans have different demographics and maturities.

Mature plans often have negative cash flows over time, which is considered the normal cycle of pension plans. Negative cash flows do not necessarily imply a plan is in trouble. In fact, part of the benefit and efficiency of prefunding derives from investment returns (in combination with invested assets) paying a significant portion of the benefit payments. The National Association of State Retirement Administrators (NASRA) notes that investment earnings account for most of the revenue for a typical public pension fund. In NASRA's Public Pension Plan Investment Return Assumption issue brief they stated that upwards of two-thirds of plan revenues come from investments.

VRS expects that the cash flow requirements will trend higher over the next ten years as more members are expected to retire and employer contributions are expected to trend lower as new members are enrolled in the hybrid retirement plan, which is a lower cost tier for employers.

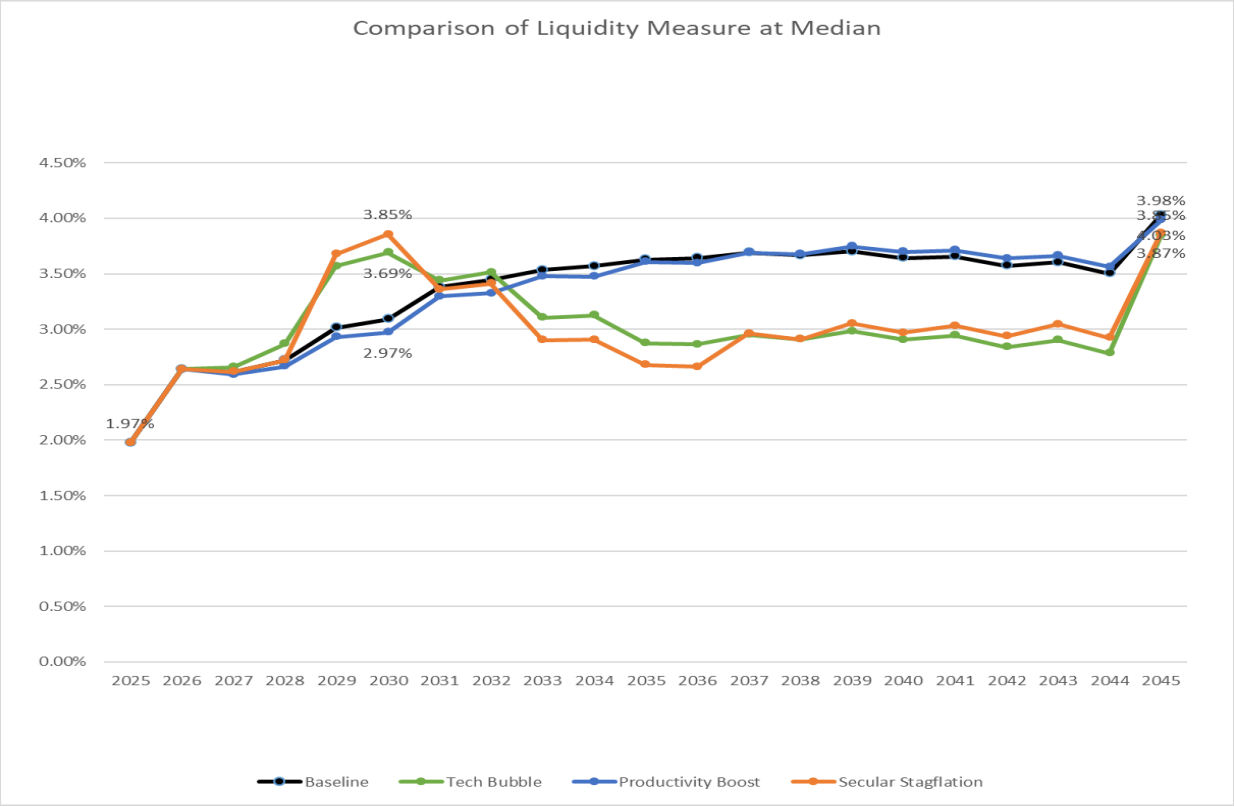
The liquidity or cash flow percentage is the benefit payments and administrative expenses minus contributions divided by the market value of assets. The percentage reflects the investment rate of return needed to keep the plan cash flow neutral for the year. Therefore, higher values mean more risk to the plan.

Highlights of Exhibit 9:

- Cash flow percentage of 1.92% for 2025 was lower than usual due to maintaining higher contribution rates for certain plans in the State budget.
- Cash flow requirements for all scenarios spike at the end of the projection period when the legacy unfunded liability is paid off resulting in a decrease in employer contributions.

- The baseline scenario expects gradual increases in cash flow requirements as funded status improves, contribution rates decrease and therefore plan assets are covering the cost of benefit payments.
- Productivity Boost anticipates slightly lower cash flow needs compared to the baseline scenario due to additional investment gains.
- Secular Stagflation and Tech Bubble scenarios have higher cash flow needs in the short term due to lower investment returns. Cash flow needs begin to decrease for these scenarios as employer contributions increase.

Exhibit 9



Results based on June 30, 2025 actuarial valuation.

During periods of prolonged volatility, assets in plans with less liquidity are more likely to be sold at a loss and, as a result, these losses may contribute to decreasing funded ratios. In the U.S., public sector pension plans, including VRS, generally hold some portion of the fund in cash and short-term investments to pay ongoing expenses, such as benefit payments and administrative costs.

Other Risks

The exhibit below highlights some non-investment related risks that could have an immediate or short-term impact on plan cash flows, costs, and liabilities. In most of these categories, the impact is related to how actual experience differs from the actuarial assumptions.

Exhibit 10

Item	Current Assumption	Impacts	Contribution Impacts	Cash Flow Impacts
Inflation	2.50%	Benefit Payments & Liabilities	Amortized over 20 Years	Immediate
Merit Increases	Variable based on Age & Service	Payroll & Normal Cost Rates	Immediate	Immediate
Longevity	Improvements factored in each year	Liabilities	Amortized over 20 Years	Small Impact Immediately
Unanticipated Retirements	Based on Plan Experience & Updated Every 4 Years	Benefit Payments, Covered Payroll, and increased Cash Flow	Amortized over 20 Years	Immediate
Workforce Reduction	Not Assumed	Lower Normal Cost but also Lower Covered Payroll	Immediate	Smaller Contributions but higher rates as percentage of payroll. Shifting costs in cost-sharing plans.
Legislative Changes	Not Assumed	Depends on Design	Depends on Design	Most Likely Immediate
Contribution Risk	100% of Actuarially Determined Contribution will be made	Cash Flow and Unfunded Liabilities	Amortized over 20 Years	Immediate Impact puts pressure on investment income to cover cash flow needs
Artificial Intelligence	Not Assumed	Varies	Varies	Developing

Inflation – VRS assumes long-term inflation will be 2.50%. With the exception of cost of living adjustments (COLAs) for retirees, periods of high inflation generally do not have an immediate impact on plan funding. However, though delayed, they eventually flow through the plan with impacts dependent on the magnitude of actual inflation compared to expectations. If actual inflation is higher than 2.50%, below are the potential impacts to the plans:

- COLAs – Since VRS COLAs are tied to the Consumer Price Index (CPI), increases above the assumed 2.50% would generate additional unfunded liabilities. This

would translate into higher contribution requirements and potentially delay full funding.

- Salaries – See merit increases below.
- Investment Returns – The investment return assumptions of 6.75% represents an inflation assumption of 2.50% plus a real return of 4.25%. During periods of high inflation, pension funds' total portfolio returns could be expected to be higher. However, real returns on equities and fixed income are more nuanced and are subject to volatility from several economic factors, therefore actual returns are dependent on a plan's holdings and asset allocation.
- Demographics - Periods of high inflation can also have demographic effects. During periods of high inflation employee layoffs could lead to decreases in covered payroll which could cause increases in employer rates. Members could also delay retirement due to economic conditions which could result in shorter periods of retirement and a decrease in unfunded liability, which could help to partially offset increased monthly benefits due to higher COLAs.

Merit Increases – VRS assumes merit increases that vary based on age and service. Merit increases in excess of what is assumed have an immediate impact by raising the annual normal cost rate and covered payroll. Conversely, since unfunded liabilities are amortized over covered payroll, if the population remains constant, the higher covered payroll could help to offset some of the impacts of the increased liability by maintaining costs at a similar level of covered payroll.

Longevity – Younger generations living longer than older generations is anticipated in the VRS mortality tables by recognizing mortality improvements. These impacts are generally recognized over longer periods of time and therefore have a relatively small impact in the near term.

Unanticipated Retirements – Members retiring earlier than expected can have immediate impacts to cash flow requirements, decreases in covered payroll, and potential increases in plan liabilities which will increase contribution rates.

Workforce Reduction – VRS assumes that all plans are ongoing and that they will have a relatively level population. In plans that have a relatively large unfunded liability, a decreasing workforce can cause an increase in the contribution rates due to a smaller covered payroll over which to collect contributions.

Legislative Changes - As plan funding levels have improved, VRS has seen an uptick in requests to enhance certain benefits. While funding levels have improved, unfunded liabilities of approximately $19 billion still remain to be paid down. If enhancements are considered, focus should not only be placed on the contribution rates required to fund the

benefits, but also the unfunded liabilities immediately generated. Again, unfunded liabilities have the potential to create additional volatility in contribution rates.

Contribution Risk – Actual contributions from employers could differ from the actuarially determined contribution requirements due to unanticipated circumstances such as shortfall in revenues due to economic downturns, reductions in covered payroll or reductions in covered employees**.**

Artificial Intelligence – Over the last 18 months Artificial Intelligence (AI) has shown that it has the ability to transform administration of public pensions. Numerous publications have highlighted how AI offers benefits in both plan administration and investment management, enhancing investment strategies, automating administration functions, and improving member engagements. They have also cautioned that the technology has the potential to disrupt labor markets, present cybersecurity issues, as well as increase litigation related to fiduciary responsibility and accountability.

AI has become a new inherent risk that must be closely monitored by VRS to maximize potential benefits while managing downside risks.

Funding Policy Considerations

As public pension plans approach 100% funding levels, plan sponsors need to incorporate "surplus" management strategies to proactively manage risk associated with full funding. Surplus in this context refers to the amount that the plan is ahead of its funding schedule, as opposed to the everyday meaning of the term as an amount left over after all requirements have been met. A retirement plan that is 100% funded means the plan's current assets equal the plan's current accrued liabilities at a point in time. So while sufficient funds exist to pay benefits for retirees at that time, it doesn't mean that contributions can stop. Future plan experience, such as smaller than expected investment returns or higher than expected cost-of-living increases, could result in additional contributions for retiree benefits. Contributions will also be required for active employees as they continue to accrue additional benefits.

Unfortunately, in many cases full funding was not handled prudently by plan sponsors or other stakeholders in the past. As the American Academy of Actuaries points out in its 2024 issue brief entitled "Surplus' Considerations for Public Pension Plans," during the 1990s when many public plans averaged investment gains in the double digits, the "surplus" generated by these investment returns "often was used to finance permanent benefit enhancements, contribution rate reductions, or both." Unfortunately, the "surplus" proved temporary and, if it had been managed differently, could have helped mitigate the

impacts of investment losses that occurred during the dot-com bubble and the Great Recession.

Public pension plans should therefore consider developing a "surplus" management strategy that is incorporated into the plan's funding policy. This strategy should articulate a path to attaining a 100% funded target as well as clearly articulate a strategy to preserve funded status once the target is achieved.

VRS has recently modified its funding policy to include asset management when a plan's funding level exceeds 100% or is ahead of schedule. When a plan's funded status is between 100% and 120%, no recognition of funding "surplus" is recognized through an amortization credit. Once above 120%, credits will be recognized using open 20-year amortization of the "surplus".

In addition to funding policy considerations, cash flow and fund liquidity also must be discussed. As benefit payments grow faster than contributions and systems' unfunded liabilities shrink, the plans' asset allocation needs to accommodate the asset drawdowns to fund benefits. If a fund lacks sufficient liquidity, it may be forced to sell investments at inopportune times. VRS has increased its cash allocation to two percent from one percent. The extra cash represents about six months' worth of benefit payments and gives the system the ability to use leverage at the total plan level. This allows the fund to rebalance without having to sell assets at a discount. The fund's asset allocation must continue to be reviewed to ensure sufficient liquidity exists to meet future cash flow needs.

Strategies to Enhance Funding

VRS continues to support strategies to lower the legacy unfunded liabilities of the plans. While these various techniques could save employers money in the future, increasing contributions, even to ultimately save money, might not be a practicable or realistic approach depending on economic conditions. Nevertheless, when revenues and fiscal conditions allow, these alternatives may serve to reduce future employer expenditures and are worth discussing here.

A decade of bull markets has shown that investment returns alone will not get rid of the legacy unfunded liabilities, which were in part the result of a failure to fund the actuarially determined and Board-certified contribution rates. Recent financial crises such as the Global Financial Crisis and impacts of the COVID-19 pandemic have shown that plans with greater unfunded liabilities will continue to be more vulnerable to market downturns. This suggests that a dedicated effort to pay down unfunded liabilities on a more accelerated basis may help to cushion any potential uncertainty that could occur with future market downturns. In recognition of the importance of reducing long-term liabilities with the

benefit of achieving savings over time, the Governor and legislature provided infusions of $750 million in June 2022 and $275 million in June 2023. In addition, the Governor and General Assembly provided $53 million in June 2024 to certain Health Insurance Credit programs.

Reduce Amortization Periods of Unfunded Liabilities

Although the current funding policy puts the plans on a path to full funding by 2042, it is important to understand how the legacy unfunded liability is being amortized and how it is expected to change over time.

To keep plan costs level over time as required by the Code of Virginia, unfunded liabilities are amortized using a "level percentage of payroll" method. This method assumes that payroll will increase over time due to both inflation and merit increases, so it aims to collect roughly the same percentage of payroll each year, which should inherently collect larger dollars in later years as payrolls increase. "Back-loaded" funding methods are commonly used to fund public sector plans, though some plans opt to use revenue growth rather than payroll growth as the basis for the growth rate. The alternative would be to amortize unfunded liabilities as a "level dollar", which would collect the same cash contribution each year like a home mortgage. This approach generally causes "front-loading" of contributions by paying a higher percentage of contributions as a percent of payroll early in the amortization period and a smaller percentage toward the end of the amortization period. Both approaches are allowable under the actuarial standards of practice.

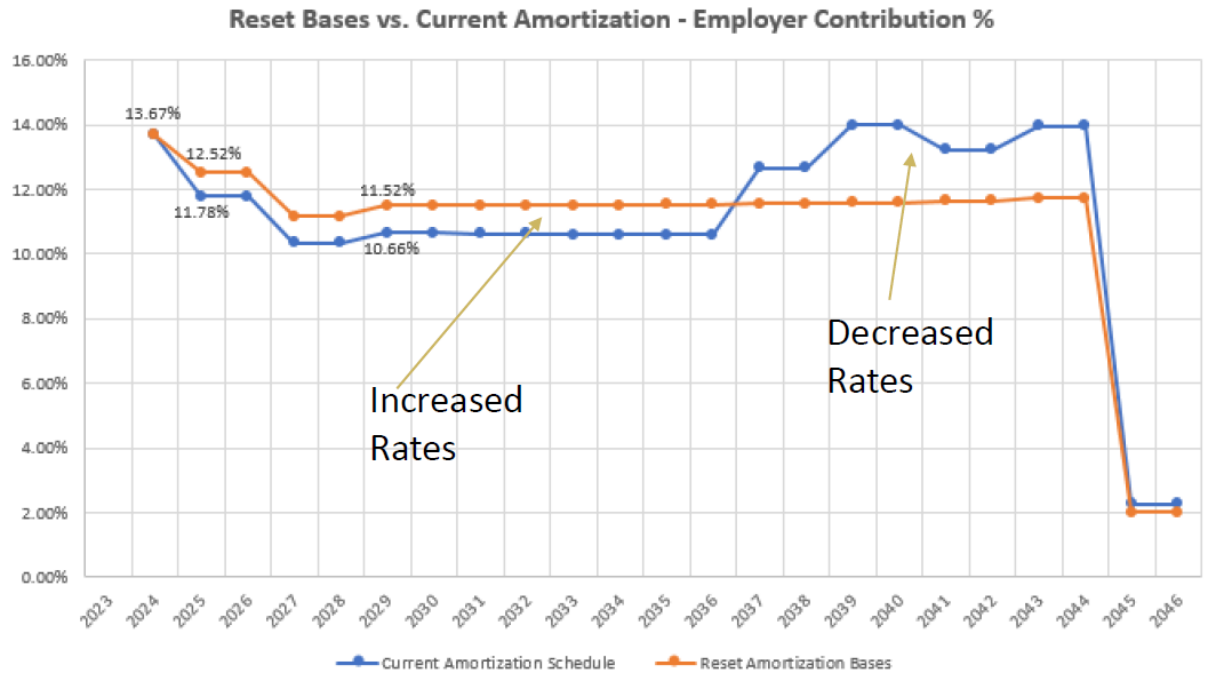
In 2013 when VRS updated its funding policy, one of the changes was to move from open to closed amortization periods in order to pay down unfunded liabilities. The use of open amortization periods to pay-off unfunded liabilities is no longer considered a best practice. VRS decided that all future gains and losses would be amortized over 20-year closed periods. The fundamental difference between open and closed amortization is that a closed amortization schedule has a strict, fixed payoff date while the open method continually resets the payoff period making it nearly impossible to eliminate the debt. This method ensures that liabilities are addresses in a systematic manner and avoids "negative amortization." Further, a 20-year closed amortization period also pays down losses more closely related to the working lifetime of members rather than pushing costs beyond their working career. Negative amortization occurs when the amortization payment is set too low to cover the interest payment on the outstanding balance, which results in an increase in the principal balance of the loss.

The legacy unfunded liability established as of 2013 was amortized over a 30-year closed period with future gain/loss bases to be amortized over 20-year closed periods. With the

2023 valuation, the legacy unfunded liability had 20 years remaining and the majority of bases established since 2013 were gains. Therefore, effective with the 2023 valuations, the legacy unfunded liability and all subsequent amortization bases established between 2014 and 2023, which were initially amortized over 20 years, were amortized over a new 20-year period. New layers established in future years will continue to be amortized over 20 years. As shown in the exhibit below, this change resulted in higher contribution rates initially, but rates are expected to remain level, and well below projected rates for 2037 through 2045. This change is expected to save around $1 billion in contributions over 20 years for State and Teachers retirement plans.

Exhibit 11

Chart below is from 2023 valuation. Current Amortization schedule is the pre-2023 schedule compared to the reset amortization schedule that took effect July 1, 2023



Results based on June 30, 2023 actuarial valuation.

Note that the 20-year projection above does not reflect any future gains or losses during the projection period, so while the above chart shows a drastic drop in the contribution rate after the legacy unfunded liabilities are fully amortized, in reality there will be other gains and losses which will impact the pattern of future contributions as new 20-year amortization bases are annually established. As actual experience evolves, employer rates

will be monitored to ensure fund allocation and liquidity are strategically aligned with overall governance of the plans.

As of June 30, 2025, the reset legacy unfunded liability for the State plan has 18 years of the original 20 years remaining to be paid, with an outstanding balance of $6.0 billion. Under the current amortization schedule, $4.4 billion of interest will be paid over the next 18 years on the $6.0 billion outstanding balance. To illustrate the impact of reducing the amortization period by just one year, exhibit 12 below shows estimated savings of reducing the amortization period and the corresponding increase in annual contribution rates. For example, adjusting the remaining amortization period for the legacy unfunded liability down to 17 years beginning with the 2025 valuation would have saved the State approximately $330 million in interest payments. The shorter amortization period would increase contribution rates by approximately 0.30% of covered payroll each year of the remaining amortization period. The exhibit also shows the additional savings for shortening the amortization by up to five years.

Exhibit 12

Amortization of Legacy Unfunded Liability
State Plan

Unfunded Balance as of 2025 $6,040,400,000

Amortization Period	Cumulative Payments over Amortization Period	Interest Paid Over Amortization Period	Amortization Payment as Percentage of Payroll	Increase in Annual Payment	Estimated Increase in Funding Initial Year	Estimated Total Savings
18	$10,467,300,000	$4,427,000,000	7.12%			
17	$10,136,900,000	$4,096,600,000	7.42%	0.30%	$18,800,000	$330,400,000
16	$9,816,600,000	$3,776,200,000	7.76%	0.64%	$21,200,000	$650,700,000
15	$9,506,100,000	$3,465,700,000	8.14%	1.02%	$24,100,000	$961,200,000
14	$9,205,100,000	$3,164,800,000	8.58%	1.46%	$27,600,000	$1,262,200,000
13	$8,913,400,000	$2,873,000,000	9.09%	1.97%	$32,000,000	$1,553,900,000

Results based on June 30, 2025 actuarial valuation.

Note that any impacts that result in flat or even declining workforce/payroll in the public sector, similar to what occurred after the Global Financial Crisis in 2008-2009, would likely result in increases in amortization payments as a percentage of payroll due to payments to the unfunded liability being less than expected. When actual payroll is less than expected, fewer dollars are contributed to the fund under the percentage of payroll amortization

method. Therefore, future contribution rates will need to increase in order to collect the necessary contributions over a smaller payroll base.

Maintain Current Contribution Rates

Maintaining current contribution levels following years in which the plan experiences actuarial gains provides additional funding without increasing the budget effort and can help to create a cushion against future actuarial losses while also improving the plan funded status. This strategy was used in the 2022 Appropriation Act and provided approximately $367 million in additional funds for the State and Teacher plans. This action lowered unfunded liabilities for the State plan by approximately $34 million over two years and is expected to lower future contribution rates by five basis points, while the Teacher plan will have approximately $382 million in reduced unfunded liabilities and future contribution rates will be reduced by 30 basis points.

Limitations on Benefit Enhancements

Another strategy adopted by the VRS Board of Trustees is to require political subdivision plans to meet specific funding measures in order to make modifications or enhancements to benefits. Plans are required to be at least 75% funded after any plan changes, which would require the employer electing a benefit modification or enhancement to make a lump sum payment at the time of a plan design change in order to maintain the plan funding level. This prevents employers from adding unfunded liabilities to their plans that can cause contribution rate volatility that the employer may not be able to afford in future years.

Legislatively mandated benefit expansions, however, must be provided by all employers despite the employer's funded status. In addition, some benefit enhancements can create immediate liabilities. If benefits enhancements are considered, focus should not only be placed on the contribution rates required to fund the benefits, but also the unfunded liabilities generated. Again, unfunded liabilities have the potential to create additional volatility in contribution rates and result in increased plan risk.

Findings & Conclusions

Fiscal years 2024 and 2025 saw growth in the markets resulting in a 9.90% fund return in each year following the years of volatile markets in the wake of the COVID-19 pandemic. Markets remain strong with inflation beginning to revert to the long-term assumption of 2.50%. However, future uncertainty exists particularly related to tariffs, lower net immigration, geopolitical tensions, and the potential for an AI bubble.

As plans mature and assets continue to grow, downside investment risk will have a bigger impact on plan funded status and employer contribution rates.

Opportunities exist to proactively address some of these concerns and to better position the retirement plans to provide the financial stability for current and future members of VRS. Accelerating payback of the legacy unfunded liability has the potential to save billions in future employer contributions while enhancing the funded status of the retirement plans. This could be achieved by:

- Reducing amortization periods for remaining legacy unfunded payments.
- Maintaining current employer contribution rates when positive experience would otherwise allow for a reduction in employer rates.
- Limiting the expansion of benefits across pension and OPEBs if corresponding lump-sum payments are not provided to cover the increases in liabilities; especially while plans remain underfunded.

Next Steps

- Due to uncertain economic conditions and geopolitical developments, analysis of future impacts on the VRS fund will continue as new information becomes available.
- While actions taken by the Governor and General Assembly, including maintaining higher contribution rates and infusing additional dollars, serve to improve plan health, these actions do not immunize the fund from downside risk because unfunded liabilities remain.
- VRS will continue to monitor the health of the plans and is committed to providing robust analysis for consideration by the VRS Board of Trustees and other stakeholders.

Appendix

§ 51.1-124.30:1. Adoption of stress testing and reporting policies.

The Virginia Retirement System (VRS) shall adopt a formal policy to:

1. Develop and regularly report sensitivity and stress test analyses. Such analyses and reporting shall include projections of benefit levels, pension costs, liabilities, and debt reduction under various economic and investment scenarios;
2. Improve investment transparency and reporting policy by (i) providing a clear and detailed online statement of investment policy; (ii) including one-year, three-year, five-year, and 10-year investment performance data in quarterly investment reports; (iii) including 20-year and 25-year investment performance data in annual investment reports; (iv) reporting net investment returns on a quarterly basis; and (v) reporting gross investment returns and returns by asset class on an annual basis; and
3. Regularly report investment performance and expenses such as external manager fees, carried interest fees, and investment department expenses for all asset classes, including private equity, public equity, fixed income, credit strategies, real assets, strategic opportunities, and other investments.

2017, c. 639.