

# Chief Investment Officer's Letter



Ronald D. Schmitz, Chief Investment Officer

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September 1, 2022

**To: Members of the Board of Trustees  
and Participants of the Virginia Retirement System**

As VRS marked the end of fiscal year 2022, the investments report was mixed. The stock market, down about 16%, was certainly less robust this past fiscal year than it was at June 30, 2021. Given the exceedingly strong returns last year, the lower return this year is not unexpected, as markets often post a period of flat to negative results after skyrocketing. Bonds were also down for the year, finishing around -11% as the Federal Reserve began hiking interest rates to slow inflation.

## PERFORMANCE OVERVIEW

The VRS portfolio benchmark of -5.5% was comfortably ahead of the traditional passive 60/40 stock/bond index return of around -10%, depending on the indexes used. VRS benefited from its diverse portfolio that includes assets such as real estate, infrastructure, timber and energy as well as private strategies in the equity and credit space. In addition, the portfolio was underweight in stock market exposure, which was helpful to relative performance in a year that saw the equity markets generate negative returns.

Overall, the VRS portfolio was modestly positive in the face of these negative public market benchmarks. The portfolio return of 0.6% is quite subdued compared to historical averages, as reflected in our long-term assumed rate of return of 6.75% annually. However, this year's returns relative to the benchmark were nothing short of remarkable. Because our investment professionals manage the fund using a risk-controlled approach, our normal value-add typically yields about half a percent of outperformance. Achieving approximately 6 percentage points of outperformance this year (+0.6% versus a benchmark of -5.5%) is an admirable result.

The level of outperformance in fiscal year 2022 puts an exclamation point on a decade of strong results. Staff decisions versus the benchmark have resulted in a value-add of \$1 billion per year on average over the last 10 years, fortifying the trust fund's position to serve current and future retirees. Putting this in perspective, the annualized value-add is roughly equal to the entirety of VRS member contributions last year.

### Annualized Return for Periods Ended June 30, 2022:

	1 Year	3 Years	5 Years	10 Years	15 Years	20 Years	25 Years
VRS Total Fund	0.6%	9.2%	8.3%	8.7%	6.0%	7.7%	7.3%
Benchmark*	-5.5%	6.1%	6.6%	7.5%	5.2%	6.8%	6.5%

*Investment return calculations were prepared using a time-weighted return methodology based on market value, net of investment expenses.*

*\* The VRS Total Fund Benchmark is a blend of the asset class benchmarks at policy weights. Benchmarks are selected with the help of a third-party investment consultant.*

## ASSET CLASS COMMENTARY

Public stock and bond markets were tough places to be over the last fiscal year. Stocks declined in the face of rising interest rates as investors used higher discount rates in valuing future income streams. And, though interest rate increases are good for yield, they cause currently held, lower-yielding bonds to decline in value.

- Equities returned -14.8%, eclipsing the benchmark's -16.2%. Our value and quality tilts were drivers of outperformance, reversing the trend of the 2018-2020 years that were driven by technology stocks. Good relative performance was seen across all regions as U.S., non-U.S. developed as well as emerging markets all performed well relative to the benchmark. Hedge funds had a disappointing year but have outperformed over the long run and protected well in the September 2022 quarter as the market continued to sell off.
- Fixed Income returns finished 40 basis points (bps) ahead of the -11% benchmark, continuing the extraordinarily consistent run of the bond team's outperformance. The bond portfolio outperformed in a shifting risk environment with underweight positions in high yield and investment grade credit, and a slight overweight in emerging market debt.

The private portfolios all had strong years, exceeding both the benchmark and the normally expected level of value-add. Credit and Private Equity portfolios were especially strong relative to the benchmark.

- Credit was led by the Non-Rate Sensitive Portfolio (direct and distressed lending), which was up 5.6% for the fiscal year, while the Rate Sensitive Portfolio (high yield and mezzanine) was down 6.2%. The portfolio was overweight non-rate sensitive, so the combination was a positive return of 1.5% against a benchmark of -6.5%.
- Private Equity had an extremely strong year – up over 27% – fueled by software and energy-related exposures. Purchase multiples were high but so were exit multiples, and gains on sale of our positions were strong. In most cases, the high prices paid for companies were justified by the high quality and rapid expected growth of the earnings stream the companies provided.
- Real Assets finished the year at 21.7%, ahead of the 18.0% benchmark. Though Public Real Estate Investment Trusts were below benchmark, Private Real Estate and Other Real Assets finished higher versus their respective benchmarks.

Multi-asset portfolios performed well versus their respective benchmarks overall. Private Investment Partnerships (PIP) exceeded their benchmark as did the two components of the Multi-Asset Public Strategies (MAPS) portfolio.

- PIP turned in strong performance for the year, comfortably beating the benchmark. Many areas of the portfolio did well, especially energy, as oil and gas prices spiked during the year. While all primary segments of the private markets did well for the year, private equity led the way and our overweight there was beneficial to performance.
- The Risk-Based Investment portfolio (RBI) had a strong year as the low correlation to public stocks served the strategy well in a down year for equities. Long Treasuries were a negative for the year, but the portfolio had downsized the bond position, thereby mitigating the decline.

- Dynamic Strategies (DSTRAT) finished slightly ahead of the benchmark, with overall results somewhat diluted by thematic strategies. The external managers collectively added value in tactical portfolios as did the in-house portfolio.

## MARKET OUTLOOK

The stock market has generally been rebounding since the end of the fiscal year. In July and early August, VRS gained back just over half of the losses from January through June. Similarly, bond yields and risk spreads over comparable maturity Treasury Bonds have recovered somewhat, though various segments of the bond market have not moved uniformly.

There are many contrary indicators regarding inflation and GDP growth:

Positives include:

- July job creation was two times the number expected.
- Unemployment in July was down slightly from already low levels.
- Hourly wages increased.
- Trucking tonnage is up.
- The Consumer Price Index seems to have moderated as energy costs and some supply chain issues have eased.

Negatives include:

- Housing starts and existing home sales are down, which to some, is ominous given normal ripple effects.
- There has been some contraction in the Purchasing Managers Index.
- There are downward adjustments in analyst earnings projections and forward guidance by chief executives and financial officers.

Of course, there are almost always contrary economic statistics as well as a lack of consensus on consumer and investor sentiment. A typical recession is where businesses don't want to hire and consumers don't want to spend, but we have the opposite — businesses want to hire, but can't find labor, and consumers want to spend, but can't find goods.

Given current market conditions, we have continued to maintain our somewhat defensive stance. Though the stock market exposure is below policy weight, that position is largely offset by an overweight to private equity assets. Should we continue to see a strong rebound in stocks as we did in July and early August, the portfolio might struggle a bit versus its benchmark. But, if the markets trend sideways to negative, as in fiscal year 2022, VRS should perform well versus the benchmark.

Importantly, we have built up a strong reserve in the last two years with performance well above the long-term assumed rate and with very strong relative performance compared to our benchmark index. We believe VRS is well positioned to continue delivering returns that allow the Commonwealth to continue to meet its obligations.

## A LAST WORD

As I approach retirement in early 2023, this will be my last annual report as Chief Investment Officer. It has truly been an honor and a privilege to work with the talented and dedicated staff at VRS over the past 11 years. Overall, the markets have been kind, and despite a number of highs and lows, the fund has nearly doubled in size from around \$50 billion to over \$100 billion. Thanks to the efforts of a dynamic team, performance has been strong as evidenced by the 10-year results shown in the table earlier in this letter. I'm proud to say that the VRS portfolio has beaten the assumed rate of return and outperformed its benchmark.

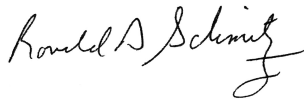
I wish to steal a quote from Coach Mike Krzyzewski after Duke lost to North Carolina in the NCAA tournament last spring. It was Coach K's final game.

*"I've been blessed to be in the arena. And when you are in the arena, you're either going to come out feeling great or you're going to feel agony. But you will always feel great about being in the arena. And I'm sure that's the thing, when I look back, that I'll miss. I won't be in the arena anymore."*

Now to personalize Coach K's last comment with a little literary license, I was in the game for a long time, and my co-workers made my last year an amazing one.

I want to thank the Board of Trustees and the Investment Advisory Committee for their support and encouragement over the years. I am also grateful to VRS Director Patricia Bishop and my colleagues in VRS administration. Andrew Junkin will take the helm as Chief Investment Officer in early 2023. Andrew is a thoughtful investor and I know the VRS portfolio is in good hands. After all, he has, like I did, the advantage of leading a strong team of investment professionals and support staff.

Sincerely,



Ronald D. Schmitz  
Chief Investment Officer

The Investment Section provides detailed information regarding the structure of the investment portfolio. This information includes performance, asset allocations, portfolio highlights, a list of VRS' money managers and public equity commissions for the fiscal year. The section also presents the System's investment management fees and expenses and an investment summary.

## Investment Account

The VRS Board of Trustees has fiduciary responsibility to invest the fund solely in the interest of the beneficiaries of the System. As established by the *Code of Virginia*, "the Board shall invest the assets of the Retirement System with the care, skill, prudence and due diligence that a prudent person acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of like character and with like aims."

Benefit payments are projected to occur over a long period of time, allowing VRS to adopt a long-term investment horizon and asset allocation policy for the management of fund assets. Asset allocation policy is critical because it defines the basic risk and return characteristics of the VRS investment portfolio. Asset allocation targets are established using an asset-liability analysis designed to assist the Board in determining an acceptable volatility target for the fund and an optimal asset allocation policy mix. The asset-liability analysis considers both sides of the VRS balance sheet in order to estimate the potential impact of various asset class mixes on key measures of total plan risk, including the resulting estimated impact on funded status and contribution rates.

The Board delegates authority to the Chief Investment Officer to allocate the System's investments within the approved asset allocation policy and within the Board-approved active risk budget. The total fund active risk budget describes the degree of tolerance for yearly variation in the fund's performance relative to the Total Fund VRS Custom Benchmark.

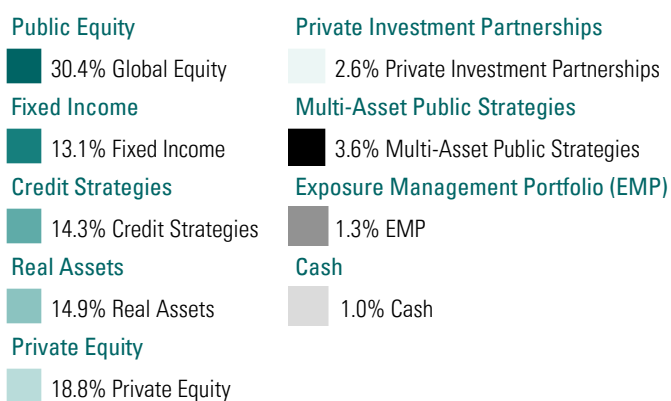
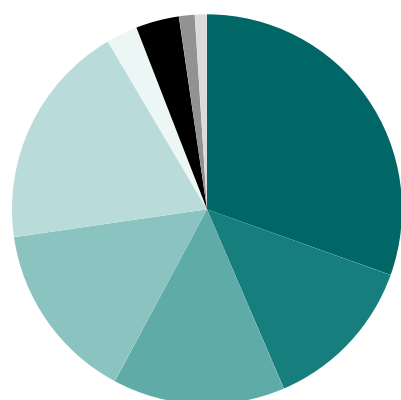
The primary risk measure used for this purpose is Total Fund Tracking Error, calculated as the standard deviation of the difference between the fund's return and the return of the Total Fund VRS Custom Benchmark. From this measure, probability estimates can be derived to help the Board estimate the risk of underperforming the benchmark by certain margins.

The investment staff manages the VRS portfolio on a day-to-day basis according to policies and guidelines established by the Board. The staff manages assets on a direct basis and through outside investment managers. Managers employ both active and passive investment strategies. The Board has established various performance benchmarks to serve as tools for measuring progress toward the achievement of long-term investment goals.

The asset allocation mix of the VRS fund as of June 30, 2022, is shown in Figure 3.1.

### FIGURE 3.1: ASSET ALLOCATION MIX

AS OF JUNE 30, 2022



### FIGURE 3.2: INVESTMENT PERFORMANCE SUMMARY

ANNUALIZED DATA FOR THE PERIOD ENDING JUNE 30, 2022

	1 Year	3 Years	5 Years	10 Years
<b>1. Total Fund</b>				
VRS	0.6%	9.2%	8.3%	8.7%
VRS Custom Benchmark <sup>1</sup>	-5.5%	6.1%	6.6%	7.5%
<b>2. Total Public Equity</b>				
VRS	-14.8%	6.1%	6.3%	9.0%
Custom Benchmark <sup>2</sup>	-16.2%	6.3%	6.9%	8.9%
<b>3. Total Fixed Income</b>				
VRS	-10.6%	0.3%	1.8%	2.3%
Custom Benchmark <sup>3</sup>	-11.0%	-1.1%	0.8%	1.5%
<b>4. Total Credit Strategies</b>				
VRS	1.5%	6.4%	6.3%	6.6%
Custom Benchmark <sup>4</sup>	-6.5%	1.8%	3.3%	4.7%
<b>5. Total Real Assets</b>				
VRS	21.7%	11.0%	10.1%	10.9%
Custom Benchmark <sup>5</sup>	18.0%	8.7%	8.1%	9.1%
<b>6. Total Private Equity</b>				
VRS	27.4%	25.5%	21.2%	17.5%
Custom Benchmark <sup>6</sup>	6.7%	15.7%	14.4%	13.7%
<b>7. Total Private Investment Partnerships</b>				
VRS	17.0%	12.7%	11.1%	N/A
Custom Benchmark <sup>7</sup>	6.9%	9.5%	9.2%	N/A
<b>8. Total Multi-Asset Public Strategies</b>				
VRS	-4.7%	3.6%	N/A	N/A
Custom Benchmark <sup>8</sup>	-8.2%	3.6%	N/A	N/A

Investment return calculations were prepared using a time-weighted return methodology based on market value, net of investment expenses.

## FIGURE 3.2: INVESTMENT PERFORMANCE SUMMARY, cont.

<sup>1</sup> The VRS Custom Benchmark is a blend of the Asset Class Benchmarks at policy weights.

<sup>2</sup> Effective February 2020, the Public Equity Custom Benchmark is the MSCI ACWI IMI (net VRS tax rates) Index.

<sup>3</sup> Effective July 2020, the Fixed Income Custom Benchmark is a blend of the Bloomberg Barclays Aggregate Bond Index (90%), Bloomberg Barclays U.S. HY Ba/B 2% Issuer Cap Index (5%), and JP Morgan EMBI Global Core Index (5%).

<sup>4</sup> Effective January 2020, the Credit Strategies Custom Benchmark is a blend of the S&P Performing Loan Index (60%), Bloomberg Barclays U.S. HY Ba/B 2% Issuer Cap Index (30%) and Bloomberg Barclays U.S. Aggregate Bond Index (10%).

<sup>5</sup> Effective July 2014, the Real Assets Custom Benchmark is the market value weighted blend of the Total Real Estate Benchmark, of which 85% is the NCREIF Private Real Estate Benchmark (ODCE Index (net) lagged by three months) and 15% is the Total REIT Benchmark (FTSE/EPRA/NAREIT Developed REIT Index), and the Other Real Assets Custom Benchmark (the CPI-U Index plus 400 basis points per annum lagged by three months).

<sup>6</sup> Effective July 2020, the Private Equity Custom Benchmark is the MSCI ACWI IMI Index (net VRS tax rates) lagged by three months.

<sup>7</sup> Effective July 2021, the Private Investment Partnerships Custom Benchmark is the weighted average of the custom Private Equity Benchmark (MSCI ACWI IMI Index (net VRS tax rates) lagged by three months) (33%), the NCREIF Private Real Estate Benchmark (ODCE Index (net) lagged by three months) (25%), the Other Real Assets Custom Benchmark (the CPI-U Index plus 400 basis points per annum lagged by three months) (8%), the Bloomberg Barclays U.S. HY Ba/B 2% Issuer Cap Index (17%), and the S&P Performing Loan Index (17%).

<sup>8</sup> Effective July 2018, the Multi-Asset Public Strategies Custom Benchmark is the market value weighted average of the benchmarks of the mandates (Dynamic Strategies and Risk-Based Investments) within the program.

## Portfolio Highlights

### PUBLIC EQUITY

The market value of the Total Public Equity Program as of June 30, 2022, was \$29.9 billion, representing approximately 30% of the total fund. The program is dominated by traditional strategies valued at \$23.25 billion or 77.7%. The program also employs equity-oriented hedge fund strategies valued at \$6.66 billion or 22.3%. The objective of the portfolio is to exceed the Custom Benchmark over longer-term periods, net of all costs. The current Custom Benchmark is the MSCI All Country World Index (ACWI) IMI (net of VRS tax rates).

The Traditional Public Equity portfolio had 59% invested in domestic equity and 41% in international equity. Internal assets are 40% of Total Public Equity.

At fiscal year-end, the ACWI IMI benchmark was comprised of 59.6% of the MSCI U.S. Investible Market Index (IMI), 28.6% of the MSCI World excluding U.S. IMI and 11.8% in the MSCI Emerging IMI.

Traditional Public Equity versus the MSCI ACWI IMI strategic sectors and region weights are as follows:

**FIGURE 3.3: TRADITIONAL EQUITY CUSTOM BENCHMARK SECTORS AND REGIONS\***

Strategic Sectors	VRS	ACWI IMI	Regions	VRS	ACWI IMI
Communication Services	8.85%	7.34%	North America	61.17%	62.99%
Consumer Discretionary	10.41%	11.17%	Europe/Middle East/Africa	19.84%	18.62%
Consumer Staples	8.23%	7.31%	Asia Pacific	17.59%	17.47%
Energy	4.46%	4.93%	Latin and South America	1.40%	0.92%
Financials	13.61%	14.36%	<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>
Health Care	14.26%	12.65%			
Industrials	9.73%	10.44%			
Information Technology	18.85%	19.83%			
Materials	4.43%	5.16%			
Real Estate	3.15%	3.63%			
Utilities	4.02%	3.18%			
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>			

\* Based on Barra's classification of sectors and regions and excludes cash.

The top 10 holdings in the Total Public Equity Program comprised 8.0% of the program at fiscal year-end.

Three companies, Berkshire Hathaway Inc., Taiwan Semiconductor Manufacturing and Meta Platforms (formerly Facebook) were replaced by Verizon Communications, Merck & Co. and Pfizer on this year's schedule.

**FIGURE 3.4: PUBLIC EQUITY – TOP 10 EXPOSURES\***

AS OF JUNE 30, 2022

Company	Fair Value	Shares
Microsoft	\$ 524,380,341	2,041,741
Apple	406,119,651	2,970,448
Alphabet	373,436,205	171,060
Johnson & Johnson	183,004,467	1,030,953
Amazon.com	166,140,055	1,564,260
Bristol-Myers Squibb	165,524,821	2,149,673
Verizon Communications	157,078,203	3,095,137
Roche Holding	139,569,959	418,479
Merck & Co.	133,955,716	1,469,296
Pfizer	130,591,543	2,490,779

\* Aggregated various share classes based on parent company. Refer to the "More Information" section on page 162 for details on how to request additional information.

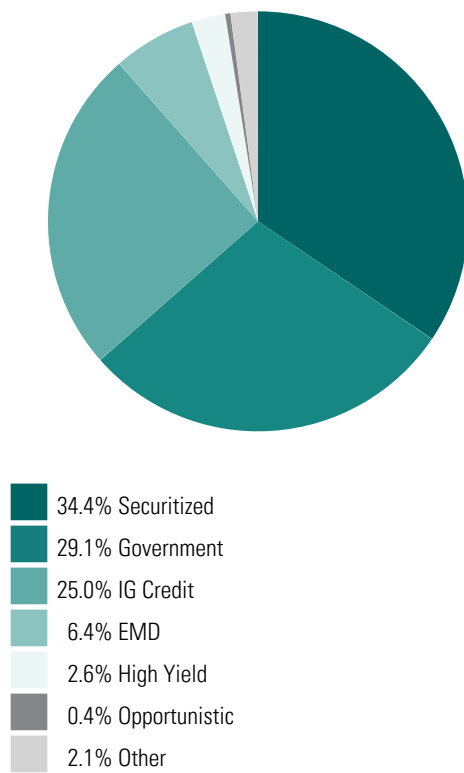


## FIXED INCOME

VRS invests a portion of its portfolio in fixed income investments to reduce total fund volatility, produce income and provide for some protection in the event of a deflationary environment. The market value of the Fixed Income Program as of June 30, 2022, was \$12.9 billion, representing approximately 13% of the total fund.

### FIGURE 3.5: FIXED INCOME PORTFOLIO BY SECTOR ALLOCATION

AS OF JUNE 30, 2022



The Fixed Income Program is invested in a diversified portfolio of debt securities, such as government securities, corporate securities, mortgage-backed securities and emerging market debt. The objective of the program is to exceed the return of the Fixed Income blended benchmark comprised of 90% Bloomberg Barclays U.S. Aggregate Index, 5% JPM EMBI Global Core Index and 5% Bloomberg Barclays U.S. HY Ba/B 2% Issuer Constrained Index, while staying in compliance with risk limits. Ninety-five percent of the Fixed Income Program is managed internally. For fiscal year 2022, the return of the program was -10.6% versus a return of -11.0% for the benchmark.

### FIGURE 3.6: FIXED INCOME – TOP 10 HOLDINGS BY MARKET VALUE\*

AS OF JUNE 30, 2022

Security	Par Value	Fair Value
FANNIE MAE/FREDDIE MAC AGENCY MBS	\$590,000,000	\$581,681,590
TREASURY NOTE	300,000,000	274,476,000
FANNIE MAE/FREDDIE MAC AGENCY MBS	270,000,000	270,999,000
FANNIE MAE/FREDDIE MAC AGENCY MBS	290,000,000	269,961,290
TREASURY NOTE	239,000,000	218,665,880
TREASURY NOTE	204,300,000	184,013,010
TREASURY NOTE	160,400,000	152,084,864
TREASURY NOTE	150,000,000	146,367,000
TREASURY NOTE	149,500,000	143,146,250
TREASURY NOTE	130,000,000	125,684,000

\* Refer to the "More Information" section on page 162 for details on how to request additional information.

### SHORT-TERM INVESTMENTS AND TRANSITION ACTIVITY

Generally, VRS desires to remain fully invested at all times and seeks to minimize its holdings of cash investments. Temporary cash balances are invested in short-term money market instruments with the goal of maintaining high credit quality and liquidity, as well as synthetically replicating exposure to equity and/or fixed income.

### PRIVATE EQUITY

VRS invests in private equity to achieve returns greater than those available in the public equity markets. Specifically, the program seeks to outperform the Morgan Stanley Capital International All Country World Index (MSCI ACWI). Program returns are calculated on both a time-weighted basis and a dollar-weighted, or internal rate-of-return (IRR) basis. On a time-weighted basis, the program return for fiscal year 2022 was 27.4%. On a dollar-weighted, or IRR basis, the private equity one-year return was 27.9% as of March 31, 2022.

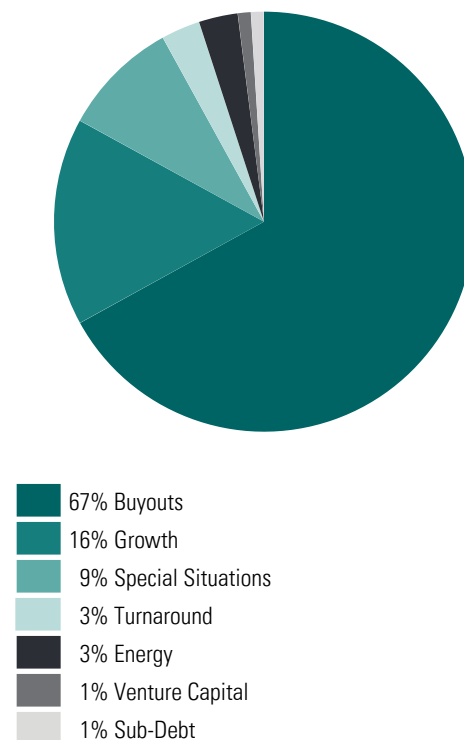
As of June 30, 2022, the carrying value of the program was approximately \$19.0 billion. Most of the program is invested in limited partnerships.

Sectors in which the program invests include leveraged buyouts, venture capital, growth, sub-

debt, turnaround, energy and special situations. The Private Equity Program's market value by subclass was as follows:

### FIGURE 3.7: PRIVATE EQUITY PROGRAM

AS OF JUNE 30, 2022



## REAL ASSETS

A portion of the VRS portfolio is invested in real assets to help diversify the Total Fund by providing exposure to asset classes and sectors that offer low historical correlations with the public markets and with the additional objectives of generating competitive risk-adjusted returns, significant operating cash flows and inflation linkages. The portfolio continued to grow in fiscal year 2022, producing an 21.7% return and outperforming the benchmark by 370 basis points. The private real estate portfolio delivered a 28.6% return while the real estate investment trusts (REITs) produced a total return of -12.9%. Investments in infrastructure, natural resources, timberland and farmland produced a 21.3% return for the fiscal year.

The percentage of the Total Fund represented by the Real Assets portfolio fluctuated over the course of the year increasing to 14.9% at fiscal year-end. In dollar terms, the real asset portfolio grew \$2.98 billion due primarily to asset income and appreciation, with contributions to new investments outpacing distributions from existing investments by approximately \$317 million.

At fiscal year-end, the portfolio strategy composition was approximately 61% private real estate, 15% infrastructure, 10% REITs, 9% energy and mining, 3% timberland and 2% farmland. Portfolio leverage as a percentage of total real assets was 27% as of June 30, 2022.

FIGURE 3.8: REAL ASSETS BY SECTOR

AS OF JUNE 30, 2022

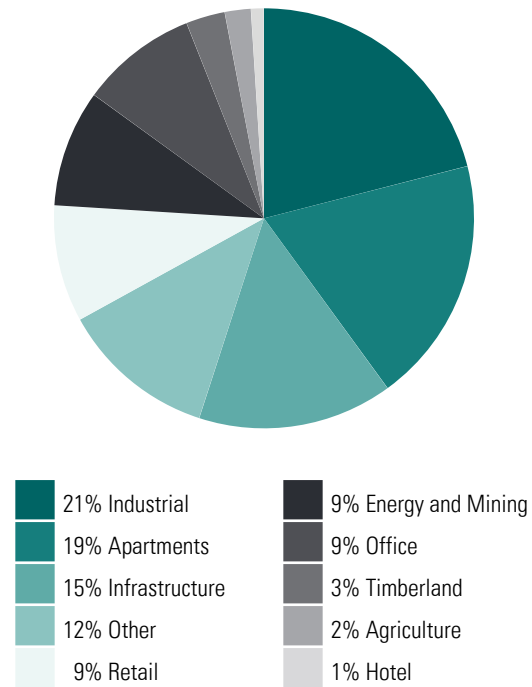
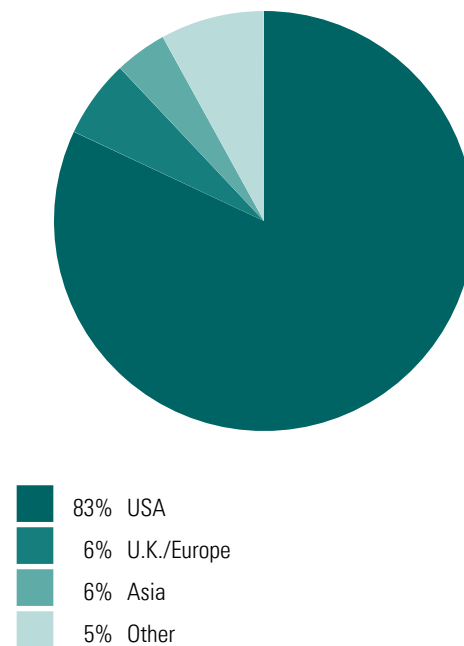


FIGURE 3.9: REAL ASSETS BY GEOGRAPHIC REGION

AS OF JUNE 30, 2022

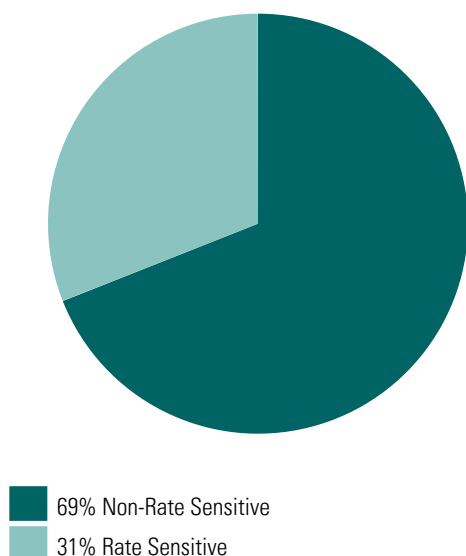


## CREDIT STRATEGIES

VRS allocates a portion of the portfolio to credit-related investments. The Credit Strategies program generates returns through income and capital appreciation. The objective of the program is to provide an attractive risk/return profile relative to the Custom Credit Strategies benchmark. For the fiscal year, the program returned 1.5%, while the program's custom benchmark returned -6.5%.

### FIGURE 3.10: CREDIT STRATEGIES PROGRAM

AS OF JUNE 30, 2022



## CURRENCY

VRS has currency risk due to its investments in non-dollar-denominated assets. To help control this risk, VRS has a Currency Program that uses a combination of internal hedging strategies and external management. The external currency management part aims to lower overall Fund volatility and provide diversified alpha across the Fund. Investments include constrained positions in global currencies. The currency positions are typically traded on a forward basis, and thus no capital is necessary at the time of the trade. At forward settlement date, gains and losses are received/paid out against a notional value.

The current notional value, as of June 30, 2022, was \$1.8 billion. For the fiscal year, it returned -1.7% versus a zero benchmark.

## MULTI-ASSET PUBLIC STRATEGIES

The Board of Trustees approved the Multi-Asset Public Strategies (MAPS) program on July 1, 2018, to manage strategies that add value and mitigate risk beyond the structure allowed by individual asset class program mandates. The program is separated into two portfolios with differing objectives. The Risk-Based Investment portfolio invests in strategies that offer meaningful diversification to the exposures of the overall Plan. The Dynamic Strategies portfolio seeks to add value across asset classes through the incorporation of macro perspectives. As of June 30, 2022, the total program had a market value of \$3.6 billion and was invested with seven multi-asset class public investments managers, three equity managers and one internally managed fixed income strategy. During the fiscal year, it returned -4.7% against the program's custom benchmark, which returned -8.2%.

## PRIVATE INVESTMENT PARTNERSHIPS

Beginning July 1, 2018, the VRS Board approved a strategic allocation to Private Investment Partnerships (PIP). These investments had previously been part of the Strategic Opportunities Portfolio. The objective of the program is to provide an attractive risk/return profile relative to the Private Investment Partnerships benchmark.

Managers in this program invest broadly across the private and less liquid components of the credit, private equity, real asset and real estate investment spaces. During the fiscal year the program returned 17% while its custom benchmark returned 6.9%.

## MORE INFORMATION

A complete list of the investment portfolio is available upon request. Address requests to the VRS FOIA Coordinator, Virginia Retirement System, P.O. Box 2500, Richmond, VA 23218-2500. More information is available at [varetire.org/web-policy/foia](http://varetire.org/web-policy/foia).

## VRS Money Managers

The diversified investment structure as of June 30, 2022, is reflected in the following tables, which list VRS managers by investment program and style.

### PUBLIC EQUITY MONEY MANAGERS

External Managers – Top 10 Managers	Style Description
Acadian Asset Management	Emerging, Non-U.S. Small-Cap
Ariel	Global
Arrowstreet Capital	Global
Baillie Gifford	Emerging, Global
Jackson Square	U.S. Small-Cap
J.P. Morgan	U.S. Large-Cap
Lansdowne	Global
LSV Asset Management	Global, Non-U.S. Small-Cap, U.S. Small-Cap
Nordea	Emerging, Global
Internal Portfolios	Style Description
Afton	U.S. Small
Internal Emerging	Emerging
Matoaka	Non-U.S. Large
Mobjack	U.S. Large
Piedmont	Non-U.S. Large
Potomac	U.S. Large
Top 10 Equity Hedge Funds	Style Description
Arisaig	Long
Cevian	Activist
Eminence	Long/Short
Farallon	Multi-Strat
Maverick Capital	Long/Short
Nitorum	Long/Short
Select	Long/Short
Taiyo	Activist
Theleme	Long/Short
ValueAct Capital	Activist

### FIXED INCOME

Internal Portfolios	Style Description
VRS Investment Grade Credit	High-Quality Corporates
VRS Securitized	Mortgage and Other Asset-Backed Securities
VRS Government	U.S. and Other Government-Related Debt
VRS Emerging Market Debt	EM Sovereign and Quasi-Sovereign Debt
VRS Systematic High Yield	High-Yield Corporates
VRS Fixed-Income Opportunistic	Various Fixed-Income Related Assets

*(Continued)*

## VRS Money Managers *(continued)*

### FIXED INCOME (cont.)

External Portfolios	Style Description
FI Payden & Rygel EMD	Emerging Market Debt
FI PIMCO EMD	Emerging Market Debt
FI Man Numeric High Yield	High-Yield Corporates

### PRIVATE EQUITY – TOP 10 MANAGERS

	Style Description
Apax Partners	Buyout
Bain Capital	Buyout
CVC Capital	Buyout
General Atlantic	Growth
Grosvenor	Customized Separate Account
GTCR	Buyout
Hellman and Friedman	Buyout
Stone Point	Buyout
TA Associates	Growth
Veritas	Buyout

### CREDIT STRATEGIES – TOP 10 MANAGERS

	Style Description
Beach Point Capital Management	Distressed, Broadly Syndicated Loans, Opportunistic
Ares Management	Direct Lending, Mezzanine, Opportunistic, Asset Based Lending
Prudential	Investment Grade, Mezzanine
J.P. Morgan	High Yield Bonds
Solus	Opportunistic, Broadly Syndicated Loans
BlackRock	Direct Lending
HPS Investment Partners	Direct Lending, Mezzanine
Pacific Investment Management Co.	High Yield Bonds
Anchorage Capital	High Yield Bonds, Opportunistic
Sixth Street Partners	Distressed, Opportunistic

### PRIVATE INVESTMENT PARTNERSHIPS

	Style Description
KKR	Multi-Asset Class Private Investments
Carlyle	Multi-Asset Class Private Investments

### CURRENCY

	Style Description
First Quadrant	Developed

## REAL ASSETS – TOP 10 MANAGERS

## Style Description

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Blackstone Real Estate Partners	Core, Enhanced Core, Opportunistic Real Estate
Clarion Partners	Enhanced Core Real Estate
Global Infrastructure Partners	Global Infrastructure
Industry Funds Management	Global Infrastructure
J.P. Morgan Asset Management Inc.	Core Real Estate
Morgan Stanley	Core Real Estate & Global Infrastructure
Pantheon Ventures	Global Infrastructure, Global Natural Resources
PGIM	Core & Enhanced Core Real Estate
Pritzker Realty Group	Enhanced Core & Opportunistic Real Estate
VRS – Internal Equity Management	Global REITs

## MULTI-ASSET PUBLIC STRATEGIES

## Style Description

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AQR	Multi-Asset Class Public Investments
Blackrock	Multi-Asset Class Public Investments
Capstone	Multi-Asset Class Public Investments
Internal Portfolio Strategy	Multi-Asset Class Public Investments
J.P. Morgan	Multi-Asset Class Public Investments
MetLife	Fixed Income
Morgan Stanley	Multi-Asset Class Public Investments
Nordea	Equities
Orchard Global	Multi-Asset Class Public Investments
Wellington	Equities

## Public Equity Commissions

AS OF JUNE 30, 2022

Broker	Commission	Shares	Average Commission Per Share
National Financial Services Corp., New York	\$ 1,224,424.15	97,085,517	\$ 0.0126
Goldman Sachs & Co., New York	1,198,042.13	115,814,313	0.0103
Credit Suisse, New York (CSUS)	1,019,531.44	137,114,081	0.0074
Morgan Stanley & Co., LLC, New York	340,880.51	99,483,704	0.0034
Merrill Lynch International London Equities	188,367.18	271,298,924	0.0007
Sanford C. Bernstein & Co. Inc., New York	185,451.33	22,642,928	0.0082
Sanford C. Bernstein & Co. Inc., London	183,814.75	24,370,422	0.0075
Merrill Lynch Pierce Fenner Smith, Inc., New York	139,659.16	10,081,920	0.0139
UBS Securities LLC, Stamford	125,629.03	13,196,366	0.0095
Financial Brokerage Group (FBG), Cairo	89,791.30	5,899,100	0.0152
Other Brokers	1,724,193.70	1,461,349,883	0.0012
<b>Total FY 2022</b>	<b>\$ 6,419,784.68</b>	<b>2,258,337,158</b>	<b>\$ 0.0028</b>

## SCHEDULE OF INVESTMENT EXPENSES

FOR THE YEAR ENDED JUNE 30, 2022

(EXPRESSED IN THOUSANDS)

	Assets Under Management	Management Fees and Expenses
<b>External Management:</b>		
Public Equity Managers	\$ 11,131,830	\$ 54,530
Fixed Income Managers	5,670,782	4,555
Credit Strategies Managers	14,321,408	99,176
Real Assets Managers	14,693,709	156,230
Alternative Investment Managers	19,360,172	146,731
Hedge Funds Managers	6,856,567	77,630
Risk-Based Investments Managers	5,363,270	14,212
Currency Managers*	—	2,700
Dynamic Strategies Managers	1,760,883	7,530
<b>Subtotal: External Management</b>	<b>79,158,621</b>	<b>563,294</b>
<b>Internal Management</b>	<b>23,282,674</b>	<b>38,123</b>
<b>Miscellaneous Fees and Expenses:</b>		
Custodial Fees	—	4,500
Legal Fees	—	1,078
Other Fees and Expenses	—	6,514
<b>Subtotal: Miscellaneous Fees and Expenses</b>	<b>—</b>	<b>12,092</b>
<b>Total</b>	<b>\$ 102,441,295</b>	<b>\$ 613,509</b>

\* The fees related to Active Currency Overlay Program are based on the managers' notional account values. The total notional value at June 30, 2022, was \$1.8 billion.



## Investment Summary

In accordance with Section 51.1-124.31 of the *Code of Virginia* (1950), as amended, the Board of Trustees has pooled substantially all defined benefit plan assets of the Virginia Retirement System, the State Police Officers' Retirement System, the Judicial Retirement System, the Group Life

Insurance Fund and the Retiree Health Insurance Credit Fund into a common investment pool. The common investment pool of the pension trust funds, other trust funds and custodial funds held the following composition of investments at June 30, 2022 and 2021:

(EXPRESSED IN THOUSANDS)

	2022 Fair Value	Percent of Total Value	2021 Fair Value	Percent of Total Value
<b>Bonds and Mortgage Securities:</b>				
U.S. Government and Agencies	\$ 5,103,220	4.96%	\$ 4,330,230	4.12%
Mortgage Securities	3,384,999	3.29%	3,845,183	3.66%
Corporate and Other Bonds	11,428,104	11.12%	14,889,600	14.17%
<b>Total Bonds and Mortgage Securities</b>	<b>19,916,323</b>	<b>19.37%</b>	<b>23,065,013</b>	<b>21.95%</b>
<b>Common and Preferred Stocks</b>	<b>22,153,695</b>	<b>21.55%</b>	<b>27,394,488</b>	<b>26.08%</b>
<b>Index and Pooled Funds:</b>				
Equity Index and Pooled Funds	12,627,783	12.28%	13,887,361	13.22%
Fixed-Income Commingled Funds	1,424,241	1.39%	1,482,629	1.41%
<b>Total Index and Pooled Funds</b>	<b>14,052,024</b>	<b>13.67%</b>	<b>15,369,990</b>	<b>14.63%</b>
<b>Real Assets</b>	<b>13,735,587</b>	<b>13.36%</b>	<b>10,754,327</b>	<b>10.24%</b>
<b>Private Equity</b>	<b>32,530,492</b>	<b>31.66%</b>	<b>27,883,423</b>	<b>26.55%</b>
<b>Short-Term Investments:</b>				
Treasurer of Virginia – LGIP Investment Pool	352,743	0.34%	503,439	0.48%
Foreign Currencies	53,176	0.05%	77,125	0.07%
<b>Total Short-Term Investments</b>	<b>405,919</b>	<b>0.39%</b>	<b>580,564</b>	<b>0.55%</b>
<b>Total Investments</b>	<b>\$ 102,794,040</b>	<b>100.00%</b>	<b>\$ 105,047,805</b>	<b>100.00%</b>

## Description of Hybrid Defined Contribution Plan

Defined contribution plan assets for Hybrid Retirement Plan members are maintained in two separate accounts. The Hybrid 401(a) Cash Match Plan account contains the hybrid plan member and employer mandatory contributions and the employer match on the voluntary member

contributions. The Hybrid 457 Deferred Compensation Plan account contains the hybrid plan member's voluntary contributions. The schedule below shows the assets in each investment option and the accumulated plan assets in each option.

### HYBRID PARTICIPANT ACCOUNT PLAN ASSETS BY FUND OPTION\*

AS OF JUNE 30, 2022

<b>Fund Name</b>	<b>Hybrid 401(a)</b>	<b>Hybrid 457</b>	<b>Total</b>
Retirement Portfolio	\$ 28,052,488	\$ 14,925,029	\$ 42,977,516
Target Date 2025 Portfolio	50,153,232	28,888,330	79,041,562
Target Date 2030 Portfolio	72,196,483	40,790,427	112,986,910
Target Date 2035 Portfolio	89,048,233	49,079,392	138,127,625
Target Date 2040 Portfolio	90,820,130	47,526,817	138,346,947
Target Date 2045 Portfolio	103,230,171	51,771,131	155,001,302
Target Date 2050 Portfolio	124,901,280	58,802,842	183,704,122
Target Date 2055 Portfolio	188,141,706	77,162,384	265,304,090
Target Date 2060 Portfolio	99,284,807	37,765,600	137,050,407
Target Date 2065 Portfolio	7,212,055	2,085,211	9,297,267
Money Market Fund	6,683,750	1,893,246	8,576,996
Stable Value Fund	2,994,303	5,061,209	8,055,512
Bond Fund	1,269,377	1,574,337	2,843,714
Inflation-Protected Bond Fund	848,764	1,094,023	1,942,787
High-Yield Bond Fund	1,274,775	1,685,811	2,960,586
Stock Fund	22,827,731	23,764,291	46,592,022
Small/Mid-Cap Stock Fund	6,825,697	7,530,228	14,355,925
International Stock Fund	3,339,125	3,753,868	7,092,994
Global Real Estate Fund	1,620,556	1,961,993	3,582,549
VRS Investment Portfolio – PIPVRSIP	33,314	26,713	60,027
VRS Investment Portfolio	277,558	200,033	477,591
Self-Directed Brokerage	1,302,801	1,378,512	2,681,314
<b>Total Plan Assets</b>	<b>\$ 902,338,336</b>	<b>\$ 458,721,430</b>	<b>\$ 1,361,059,766</b>

\* Fund totals have been rounded to the nearest dollar amount. Differences in totals are due to rounding.

## Description of Defined Contribution Plans Investment Options

Participants in the System's Hybrid Retirement Plan benefit structure have access to a number of core investment options for contributions to their defined contribution plan. These options are intended to provide participants with a variety of investment choices while controlling the associated costs. In addition to the option-specific annual operating expense detailed in the Investment Option Performance Summary, participants pay an annual record-keeping fee of \$30.50 that is deducted from their accounts on a monthly basis (approximately \$2.54 per month).

Participants with more than one account in the Plan pay only one annual fee of \$30.50. At June 30, 2022, the plans provided the following core investment options to participants.

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### DO-IT-FOR-ME FUNDS

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**Retirement Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that object, the portfolio will be broadly diversified across global asset classes.

U.S. Bonds: 54.7%   U.S. Large/Mid-Cap Stocks: 21.3%   International Stocks: 12.3%  
U.S. Inflation-Index Bonds: 5.8%   U.S. Small-Cap Stocks: 2.9%  
Commodities: 1.5%   Developed Real Estate: 1.4%

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**Target Date 2025 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Bonds: 48.0%   U.S. Large/Mid-Cap Stocks: 25.4%   International Stocks: 15.1%  
U.S. Inflation-Index Bonds: 5.4%   U.S. Small-Cap Stocks: 2.7%  
Developed Real Estate: 2.0%   Commodities: 1.4%

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**Target Date 2030 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Bonds: 36.4%   U.S. Large/Mid-Cap Stocks: 32.7%   International Stocks: 20.2%  
U.S. Inflation-Index Bonds: 4.7%   Developed Real Estate: 2.6%  
U.S. Small-Cap Stocks: 2.2%   Commodities: 1.2%

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**Target Date 2035 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 39.6%   U.S. Bonds: 25.8%   International Stocks: 25.0%  
U.S. Inflation-Index Bonds: 3.7%   Developed Real Estate: 3.3%  
U.S. Small-Cap Stocks: 1.7%   Commodities: 1.0%

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**Target Date 2040 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 46.1%   International Stocks: 29.7%   U.S. Bonds: 15.6%  
Developed Real Estate: 3.9%   U.S. Inflation-Index Bonds: 2.6%   U.S. Small-Cap Stocks: 1.4%   Commodities: 0.7%

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**Target Date 2045 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 51.7%   International Stocks: 33.7%   U.S. Bonds: 7.1%  
Developed Real Estate: 4.4%   U.S. Inflation-Index Bonds: 1.5%   U.S. Small-Cap Stocks: 1.2%   Commodities: 0.4%

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**Target Date 2050 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 55.3%   International Stocks: 36.2%   Developed Real Estate: 4.7%  
U.S. Bonds: 2.3%   U.S. Small-Cap Stocks: 1.0%   U.S. Inflation-Index Bonds: 0.5%   Commodities: 0.1%

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**Target Date 2055 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 56.2%   International Stocks: 37.0%   Developed Real Estate: 4.7%  
U.S. Small-Cap Stocks: 1.0%   U.S. Bonds: 0.8%   U.S. Inflation-Index Bonds: 0.2%   Commodities: 0.1%

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**Target Date 2060 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 56.2%   International Stocks: 36.9%   Developed Real Estate: 4.7%  
U.S. Small-Cap Stocks: 1.0%   U.S. Bonds: 1.0%   U.S. Inflation-Index Bonds: 0.1%

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**Target Date 2065 Portfolio:** Seeks to provide for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase based on quantitatively measured risk that investors, on average, may be willing to accept. In pursuit of that objective, the portfolio will be broadly diversified across global asset classes, with asset allocations becoming more conservative over time.

U.S. Large/Mid-Cap Stocks: 56.2%   International Stocks: 37.0%   Developed Real Estate: 4.7%  
U.S. Small-Cap Stocks: 1.0%   U.S. Bonds: 1.0%

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## HELP-ME-DO-IT FUNDS

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**Money Market Fund:** Seeks to provide a high level of current income as is consistent with liquidity and stability of principal.

Other Repurchase Agreement: 60.0%   Certificate of Deposit: 12.7%  
Asset-Backed Commercial Paper: 9.9%   Non-Negotiable Time Deposit: 8.2%  
U.S. Government Agency Repurchase Agreement: 5.8%   Financial Company Commercial Paper: 2.2%  
U.S. Treasury Repurchase Agreement: 0.8%   Non-Financial Company Commercial Paper: 0.4%

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**Stable Value Fund:** Seeks to provide safety of principal, while earning a level of interest income consistent with an underlying portfolio of short- to intermediate-duration high-quality fixed income (bond) securities and cash or cash equivalents, and liquidity to accommodate participant transactions.

Corporates: 27.4%   Asset-Backed: 18.1%   Agency MBS: 17.1%   U.S. Treasury/Agency: 14.8%   Cash/Equivalents: 6.8%  
CMBS: 6.8%   Taxable Municipals: 4.8%   Other U.S. Government: 3.6%   Non-Agency MBS: 0.6%

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**Bond Fund:** Seeks to track the performance of the Bloomberg Aggregate Bond Index. The index is an unmanaged index that represents the broad U.S. investment-grade bond market and is comprised of U.S. treasury securities, government agency bonds, corporate bonds, mortgage-backed securities, asset-backed securities and a small amount of foreign bonds traded in the U.S.

Treasury: 40.9%   Mortgages: 27.9%   Industrials: 14.0%   Financials: 7.9%   Non-U.S. Credit: 3.3%   CMBS: 2.0%  
Utilities: 2.0%   Agencies: 1.0%   Taxable Municipals: 0.6%   Asset-Backed Securities: 0.3%   Cash: 0.1%

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**Inflation-Protected Bond Fund:** Seeks to track the performance of the Bloomberg U.S. Treasury Inflation-Protected Securities Index. The index is an unmanaged index that represents the U.S. Treasury Inflation-Protection Securities (TIPS) market. The index includes investment-grade TIPS with one or more years to final maturity.

U.S. Treasury: 99.2%   Cash: 0.8%

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**High-Yield Bond Fund:** Seeks to achieve returns that exceed, over time, its benchmark, the ICE BofA U.S. High-Yield BB-B Constrained Index. The index is an unmanaged index of BB-B rated securities that caps any single issuer exposure to 2.0%. The index is indicative of the higher quality high-yield bond market.

Consumer Cyclical: 22.5%   Consumer Non-Cyclical: 20.3%   Communications: 19.1%  
Energy: 10.7%   Capital Goods: 9.3%   Technology: 5.8%   Basic Industry: 4.0%  
Finance: 2.9%   Transportation: 1.7%   Other/Cash: 1.6%   Other Industrial: 1.2%   Utilities: 0.9%

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**Stock Fund:** Seeks to track the performance of the Standard & Poor's 500 Index. The index is an unmanaged index that represents the broad large-capitalization U.S. stock market and is comprised of 500 widely held U.S. stocks chosen by Standard & Poor's.

Information Technology: 26.8%   Health Care: 15.1%   Financials: 10.8%  
Consumer Discretionary: 10.5%   Communication Services: 8.9%   Industrials: 7.8%   Consumer Staples: 7.0%  
Energy: 4.4%   Utilities: 3.1%   Real Estate: 2.9%   Materials: 2.6%

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**Small/Mid-Capitalization Stock Fund:** Seeks to track the performance of the Russell 2500 Index. The index is an unmanaged index that represents the broad middle- to smaller-capitalization U.S. stock market.

Industrials: 16.9%   Financials: 16.0%   Information Technology: 14.7%   Health Care: 13.0%  
Consumer Discretionary: 11.1%   Real Estate: 8.8%   Materials: 5.6%  
Energy: 4.5%   Consumer Staples: 3.4%   Utilities: 3.2%   Communication Services: 2.8%

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**International Stock Fund:** Seeks to track the performance of the MSCI ACWI ex-U.S. IMI Index. The index is an unmanaged index that represents the equity performance of large, mid- and small-cap segments of developed and emerging markets, excluding the U.S.

Financials: 19.0%   Industrials: 12.9%   Consumer Discretionary: 11.7%  
Information Technology: 11.0%   Health Care: 9.4%   Consumer Staples: 8.6%   Materials: 8.5%  
Communication Services: 6.1%   Energy: 5.7%   Real Estate: 3.6%   Utilities: 3.4%

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**Global Real Estate Fund:** Seeks to track the performance of the FTSE EPRA/NAREIT Developed Index. The index is an unmanaged index that is designed to reflect the performance of listed real estate companies worldwide, including the U.S.

Specialized REITs: 15.4%   Retail REITs: 15.2%   Residential REITs: 14.7%   Industrial REITs: 13.7%  
Office REITs: 9.0%   Real Estate Operating Companies: 8.1%   Health Care REITs: 7.8%   Diversified REITs: 7.5%  
Diversified Real Estate Activities: 5.1%   Hotel & Resort REITs: 2.4%  
Real Estate Development: 1.2%

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**VRS Investment Portfolio (VRSIP):** Seeks to maximize return while managing risk within an acceptable range. Due to the long-term nature of the defined benefit plan's liabilities, the horizon for investment decisions is generally defined as 10 years or longer.

Public Equity: 30.5%   Private Equity: 18.8%   Fixed Income: 13.1%   Credit Strategies: 14.3%  
Real Assets: 14.9%   MAPS: 3.6%   PIP: 2.6%   EMP: 1.3%   Cash: 1.0%

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## DO-IT-MYSELF FUNDS

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**Self-Directed Brokerage Account (SDBA):** Allows investors to select from thousands of publicly traded mutual funds, exchange-traded funds (ETFs) and individual securities in addition to the available core investment options. The SDBA option is offered through TD Ameritrade. The SDBA option is for knowledgeable investors who acknowledge and understand the risks and costs associated with the investments contained in this option.

In addition to the annual record-keeping fee and operating expenses, this option is subject to transaction fees charged by TD Ameritrade and investment management-related fees and expenses for the funds or investments selected.

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## Investment Option Performance Summary: Defined Contribution Plans

AS OF JUNE 30, 2022

(RETURNS GREATER THAN ONE YEAR ARE ANNUALIZED)

### DO-IT-FOR-ME PATH: TARGET DATE PORTFOLIOS

Investment Options	Inception Date	1 Year	3 Years	5 Years	10 Years or Since Inception	Total Annual Operating Expenses	
						As a %	Per \$1,000
<b>Retirement Portfolio</b>	<b>08/01/05</b>	<b>(11.69)%</b>	<b>2.77%</b>	<b>3.93%</b>	<b>4.57%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(11.68)%	2.72%	3.89%	4.52%		
<b>Target Date 2025 Portfolio</b>	<b>07/05/06</b>	<b>(12.10)%</b>	<b>3.48%</b>	<b>4.75%</b>	<b>5.99%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(12.11)%	3.42%	4.69%	5.93%		
<b>Target Date 2030 Portfolio</b>	<b>08/01/05</b>	<b>(12.88)%</b>	<b>4.21%</b>	<b>5.40%</b>	<b>6.70%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(12.92)%	4.14%	5.33%	6.61%		
<b>Target Date 2035 Portfolio</b>	<b>07/05/06</b>	<b>(13.64)%</b>	<b>4.90%</b>	<b>6.03%</b>	<b>7.34%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(13.71)%	4.81%	5.93%	7.24%		
<b>Target Date 2040 Portfolio</b>	<b>08/01/05</b>	<b>(14.42)%</b>	<b>5.47%</b>	<b>6.54%</b>	<b>7.90%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(14.51)%	5.36%	6.43%	7.78%		
<b>Target Date 2045 Portfolio</b>	<b>07/05/06</b>	<b>(15.12)%</b>	<b>5.93%</b>	<b>6.92%</b>	<b>8.34%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(15.25)%	5.80%	6.78%	8.20%		
<b>Target Date 2050 Portfolio</b>	<b>09/30/07</b>	<b>(15.57)%</b>	<b>6.13%</b>	<b>7.07%</b>	<b>8.60%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(15.72)%	6.00%	6.93%	8.46%		
<b>Target Date 2055 Portfolio</b>	<b>05/19/10</b>	<b>(15.68)%</b>	<b>6.15%</b>	<b>7.08%</b>	<b>8.75%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(15.86)%	6.02%	6.94%	8.61%		
<b>Target Date 2060 Portfolio</b>	<b>11/17/14</b>	<b>(15.69)%</b>	<b>6.41%</b>	<b>7.07%</b>	<b>6.74%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(15.86)%	6.02%	6.94%	6.58%		
<b>Target Date 2065 Portfolio</b>	<b>09/23/19</b>	<b>(15.71)%</b>	<b>N/A</b>	<b>N/A</b>	<b>6.19%</b>	<b>0.08%</b>	<b>\$0.80</b>
Custom Benchmark <sup>1</sup>		(15.88)%	N/A	N/A	6.16%		

(Continued)

## Investment Option Performance Summary: Defined Contribution Plans (cont.)

### HELP-ME-DO-IT PATH: INDIVIDUAL OPTIONS

Investment Options	Inception Date	1 Year	3 Years	5 Years	10 Years or Since Inception	Total Annual Operating Expenses	
						As a %	Per \$1,000
<b>Money Market Fund</b> Benchmark: FTSE 3-Month Treasury Bill Index Yield as of June 30, 2022, was 1.73%	<b>11/01/99</b>	<b>0.37%</b>	<b>0.73%</b>	<b>1.26%</b>	<b>0.74%</b>	<b>0.08%</b>	<b>\$0.80</b>
<b>Stable Value Fund</b> Custom Benchmark <sup>2</sup> Yield as of June 30, 2022, was 1.54%	<b>02/01/95</b>	<b>1.47%</b>	<b>1.93%</b>	<b>2.03%</b>	<b>1.87%</b>	<b>0.23%</b>	<b>\$2.30</b>
<b>Bond Fund</b> Benchmark: Bloomberg U.S. Aggregate Bond Index	<b>11/01/99</b>	<b>(10.22)%</b>	<b>(0.89)%</b>	<b>0.92%</b>	<b>1.61%</b>	<b>0.03%</b>	<b>\$0.30</b>
<b>Inflation-Protected Bond Fund</b> Benchmark: Bloomberg U.S. Treasury Inflation-Protected Securities Index	<b>07/30/02</b>	<b>(5.17)%</b>	<b>3.11%</b>	<b>3.30%</b>	<b>1.81%</b>	<b>0.03%</b>	<b>\$0.30</b>
<b>High-Yield Bond Fund</b> Benchmark: ICE BofA U.S. High-Yield BB-B Constrained Index	<b>05/31/04</b>	<b>(11.17)%</b>	<b>0.92%</b>	<b>2.75%</b>	<b>4.75%</b>	<b>0.39%</b>	<b>\$3.90</b>
<b>Stock Fund</b> Benchmark: S&P 500 Index	<b>11/01/99</b>	<b>(10.61)%</b>	<b>10.64%</b>	<b>11.35%</b>	<b>12.99%</b>	<b>0.01%</b>	<b>\$0.10</b>
<b>Small/Mid-Cap Stock Fund</b> Benchmark: Russell 2500 Index <sup>3</sup>	<b>11/01/99</b>	<b>(20.93)%</b>	<b>5.96%</b>	<b>7.08%</b>	<b>10.57%</b>	<b>0.02%</b>	<b>\$0.20</b>
<b>International Stock Fund</b> Benchmark: MSCI ACWI ex-U.S. IMI Index <sup>4</sup>	<b>11/01/99</b>	<b>(19.40)%</b>	<b>1.89%</b>	<b>2.82%</b>	<b>5.66%</b>	<b>0.06%</b>	<b>\$0.60</b>
<b>Global Real Estate Fund</b> Benchmark: FTSE EPRA/NAREIT Developed Index <sup>5</sup>	<b>10/01/02</b>	<b>(12.75)%</b>	<b>(0.30)%</b>	<b>2.72%</b>	<b>5.46%</b>	<b>0.08%</b>	<b>\$0.80</b>
<b>VRS Investment Portfolio (VRSIP)</b> VRS Custom Benchmark <sup>6</sup>	<b>07/01/08</b>	<b>0.65%</b>	<b>9.16%</b>	<b>8.34%</b>	<b>8.73%</b>	<b>0.59%</b>	<b>\$5.90</b>

<sup>1</sup> Benchmarks are calculated using blended returns of third-party indices that proportionately reflect the respective weightings of the Portfolios' asset classes. Weightings are adjusted quarterly to reflect the Portfolios' asset allocation shifts over time. Indices currently used to calculate the custom benchmarks are Russell 1000 Index, Russell 2000 Index, MSCI ACWI ex-U.S. IMI Net Dividend Return Index, Bloomberg U.S. Long Credit Bond Index, Bloomberg U.S. Intermediate Credit Bond Index, Bloomberg U.S. Long Government Bond Index, Bloomberg U.S. Intermediate Government Bond Index, Bloomberg U.S. Securitized: MBS, ABS, and CMBS Index, Bloomberg U.S. Treasury Inflation Protection Securities (TIPS) Index (Series L), FTSE EPRA NAREIT Developed Index, and the Bloomberg Commodity Index Total Return.

<sup>2</sup> Effective August 2016, the benchmark represents a hypothetical return generated by the monthly yields of actively traded U.S. Treasuries based on [50% two-year maturity + 50% three-year maturity] plus an annualized spread of 0.25% and is representative of the Fund's expected return profile, given how the Fund is managed and book value accounting treatment. Prior to August 2016, the custom benchmark was based on the monthly yield of actively traded U.S. Treasuries with a three-year maturity plus an annualized spread of 0.50%. The benchmark returns are linked.

<sup>3</sup> Effective July 2012, the performance benchmark is the Russell 2500 Index. Prior to July 2012, the performance benchmark was the Russell Small-Cap Completeness Index. The benchmark returns are linked.

<sup>4</sup> Effective August 2016, the performance benchmark is the MSCI ACWI ex-U.S. IMI Index. It was the MSCI World ex-U.S. Index from July 2012 through July 2016, and prior to July 2012, it was the MSCI EAFE Index. The benchmark returns are linked.

<sup>5</sup> Effective July 2012, the performance benchmark is the FTSE EPRA/NAREIT Developed Index. Prior to July 2012, the performance benchmark was the Dow Jones U.S. Select REIT Index. The benchmark returns are linked.

<sup>6</sup> The VRS Custom Benchmark is a blend of the asset class benchmarks at policy weights.