Memorandum

To	CalSTRS Investment Committee
From	RVK
Subject	Reference Portfolio Benchmark
Date	September 13, 2023

Background

The CalSTRS Investment Committee seeks a simple Reference Portfolio Benchmark to be included in its Investment Policy and Management Plan ("IPMP"), with the goal of creating a more simplistic benchmark for comparison purposes. Over the past 5+ years, both Staff and Meketa – the Investment Committee General Consultant – have provided educational presentations on benchmarking, highlighting the various approaches utilized by many of CalSTRS' peers. As noted by both parties, there is not a single, widely held standard for benchmarking a total fund; however, there are several options that each provide value in the total fund performance measurement exercise. The purpose of this memo is to explore further one of these options – the reference portfolio – and ultimately recommend a specific benchmark for the Investment Committee's consideration.

Reference Portfolios

Reference portfolios can be considered one of the most basic forms of benchmarks and often represent the starting point for an asset owner's portfolio as they are a moderately diversified (albeit simple) portfolio implementation. A reference portfolio – over a sufficiently long period – should loosely track the performance of the actual investment strategy and implementation employed in the total fund. This style of benchmark is also often used to compare to an asset owner's more diversified asset allocation choices, such as CalSTRS' "Policy Benchmark Index". Relative performance between a reference portfolio and the Policy Benchmark Index indicates whether further diversification – beyond the simple asset class exposures which comprise the reference portfolio – has been additive to the total fund's performance.

Selecting a proper reference portfolio requires intimate knowledge of an asset owner's overall risk tolerance and preferences or restrictions, as well as the beta characteristics of the fund. While it is very much an art, there are a few questions each asset owner should address before selecting a reference portfolio:

- Is the level of risk inherent in the reference portfolio consistent with the risk preferences of the fiduciaries?

- How does the expected risk and return of the reference portfolio compare to the diversified portfolio?

- Is the expected risk and return of the reference portfolio consistent with the total fund's purpose?

- Will the total fund be implemented with local securities, or will it take a more global approach?

- What is the likelihood of the reference portfolio meeting the assumed rate of return?

Meketa – with concurrence from Staff – has narrowed the potential Reference Portfolio Benchmark to two options, both of which are a variant of a simple, straightforward mix of the most common global equity and US public fixed income indexes:

- 70% MSCI ACWI/30% Bloomberg Aggregate Bond Index
- 60% MSCI ACWI/40% Bloomberg Aggregate Bond Index

To properly analyze which option is a better fit for CalSTRS' portfolio, it is vital to understand the asset allocation approach and risk tolerance adopted by the Board.

CalSTRS Asset Allocation

The current asset allocation targets were approved in May 2023 and can be viewed through a variety of lenses (per the CalSTRS IPMP):

High Level	Strategic Class	Asset Class
Equity 67%	Economic Growth 52%	Public Equity 38%
		Private Equity 14%
Other Assets 33%	Real Assets 22%	Real Estate 15%
		Inflation Sensitive 7%
	Diversifying 26%	Risk Mitigating Strategies 10%
		Fixed Income 14%
		Cash/Liquidity 2%

The asset allocation has been structured specifically with the System's liabilities in mind through numerous comprehensive Asset Liability Studies and has undergone a gradual transformation to a more diversified and risk-aware approach, particularly since 2009.

Expected Returns and Risk

Forecasting is an exercise in uncertainty but still plays an integral part in portfolio construction, management, and implementation. Part of this exercise entails the creation of capital markets assumptions for various asset classes, and ultimately an assumption for the expected return and standard deviation of the total fund. As part of this project, RVK has modeled the following three asset class blends to compare the risk and return characteristics:

Asset Mix	Expected Return	Expected Std. Deviation	Expected Global Equity Beta
Policy Benchmark	7.1%	10.7%	0.60
70/30 Blend	6.7%	11.7%	0.70
60/40 Blend	6.3%	10.3%	0.61

It is important to note that these figures utilize RVK's proprietary capital markets assumptions and will differ from

those approved by the Investment Committee and created by Staff or Meketa. However, the important aspect of this comparison is the relative difference between the two potential Reference Portfolio Benchmarks and the current Policy Benchmark Index. As demonstrated, the Policy Benchmark – a reasonable proxy for the CalSTRS total fund – has a similar return to that of the 70/30 blend, with volatility expected to land marginally closer to that of the 60/40 blend. It is noteworthy that the expected standard deviation of the Policy Benchmark Index is not a true comparison of total fund risk as it includes private/illiquid and complex asset classes, whereas the 70/30 and 60/40 blends are strictly public and liquid securities. Equity beta – a simple measure of sensitivity – is an additional risk factor considered when evaluating reasonableness of benchmarks and portfolios. The expected equity beta is nearly identical for the Policy Benchmark Index and the 60/40 blend and meaningfully higher for the 70/30 blend.

Asset Mapping

Viewed from an asset allocation mapping approach, the 60/40 blend appears to be a better fit, as well. The exercise conducted summarized below maps current policy targets by asset class to a Reference Portfolio Benchmark with a goal of identifying whether the asset class would be better suited to be measured relative to equity or fixed income. This same exercise can often be used in the asset allocation process and assists in answering the question or whether the additional complexity of diversification is additive to the portfolio. Most asset classes have a clear role in the portfolio and map directly to equity or fixed income; however, Real Estate and Inflation Sensitive asset classes were split between the two, based on CalSTRS' Policy targets and/or ranges to various sub-strategies.

Asset Class	Mapping	Reference Portfolio Benchmark
Public Equity 38%	→	60% Equity
Private Equity 14%	→	
Real Estate (VA/Opp.) 6%	→	
Inflation Sensitive (Comm.) 2%	→	
Real Estate (Core) 9%	→	40% Fixed Income
Inflation Sensitive (Infra/TIPs/Agr./Tim.) 5%	→	
Risk Mitigating Strategies 10%	→	
Fixed Income 14%	→	
Cash/Liquidity 2%	→	

Conclusion and Recommendation

In RVK's view, the most important purpose of the reference portfolio is in assisting asset owners in setting a risk tolerance, thus allowing actual implementation – however more complex than the reference portfolio – to be evaluated on an "apples to apples" risk basis. While the expected return of various asset blends is important to consider when choosing a reference portfolio, the performance differential between the actual portfolio and its benchmark should be largely driven by implementation differences, not expected levels of volatility. The goal of moving away from a simple implementation such as 60% public equity/40% public fixed income should be to improve the return-to-risk ratio and be measured as such. This approach is also consistent with the stated and implied goals for the Reference Portfolio Benchmark found in the CalSTRS IPMP; the language is focused on providing a comparison to a benchmark with similar risk and one that is publicly available and clearly defined. The comparable expected standard deviation and equity beta between the Policy Benchmark and the 60/40 blend, along with the asset mapping view further supports its use as the Reference Portfolio Benchmark.

While both potential Reference Portfolio Benchmark options are reasonable and would be appropriate for CalSTRS, **RVK recommends utilizing a blend consisting of 60% MSCI ACW Index and 40% Bloomberg Aggregate Bond Index.**