ARIZONA STATE RETIREMENT SYSTEM

Independent ASRS Investment Program Oversight for the Period Ending December 31, 2023

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NEPC, LLC

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DISCLOSURE

- **NEPC has developed reports for both the Investment Committee and Board designed to 1) provide the appropriate level of investment information for the purposes of independent oversight (ASRS SAAP compliance, Asset Class Committee minutes review, investment selection due diligence packet compliance and oversight of the investment program data used to compile NEPC and ASRS reporting); 2) provide ASRS investment program performance relative to its goals/objectives (presented quarterly); and 3) communicate NEPC's perspectives on the market environment, investment outlook or other initiatives or topics they believe are important to convey to the Board.**

- **NEPC has completed a quarter-end quality control process and warrants that IMD Staff materials are accurate subject to the following process:**
  - Investment results were calculated using data provided by the Plan's custodian bank that is deemed "final" as of December 31, 2023.
  - Investment performance oversight includes reconciliation and confirmation of portfolio level valuations, cash flows, transactions and composite construction including interpretation of investment accounting methods used to track IMD Staff instructed activities.
  - Oversight of performance calculation includes verification of Staff data used to produce reporting as well as verification of processes and procedures in custom investment performance calculations.
  - NEPC performed tests of the data produced by IMD Staff and the Plan's custodian bank (book of record) using underlying financial records provided by the custodian bank and IMD Staff. The net effect of uncorrected misstatements has been brought to the attention of IMD Staff.

ASRS INVESTMENT OBJECTIVES

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	Goal 2: Excel at Investment Performance			
	Ongoing Objectives	Goal Met	Comment	Action Required
1	Maximize total fund net rates of return for acceptable levels of risk.	Yes	ASRS maintains high peer ranks in risk-adjusted returns.	None
2	Achieve total fund net rates of return in the top 25th percentile or better compared to peers.	Partial	Short-run peer rankings are below median. Longer-run trailing time periods are ranked in the top decile.	None
3	Achieve total fund net rates of return greater than the Strategic Asset Allocation Policy benchmark	Partial	Total Fund underperformed its SAAP in the last one-year period. Private Equity and Credit underperformed. Over longer time periods, Private Equity, Credit and Real Estate are driving outperformance.	None
4	Achieve total fund net rates of return greater than the actuarial assumed interest rate.	Yes	All trailing time periods of one-year or more exceed 7%.	None
5	Achieve asset class net rates of return that are greater than their respective benchmarks.	Partial	Private Equity and Credit underperformed in the last one-year.	None
6	Ensure sufficient cash is always available to meet all internal and external cash-flow requirements.	Yes	ASRS maintained sufficient cash to operate the Fund.	None

Source: ASRS Strategic Plan For the Five Fiscal Year Period from July 1, 2023 to June 30, 2028
Note: Total Fund comparison versus Interim SAAP

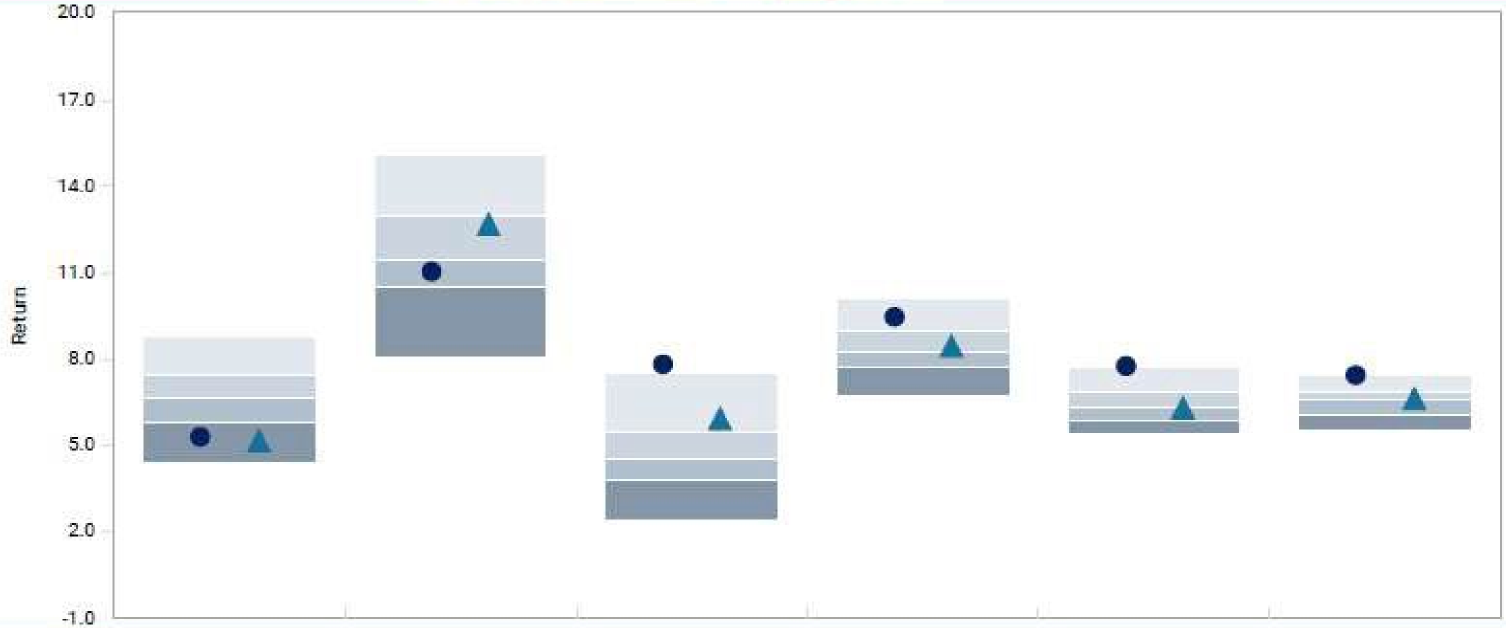
EXPECTED 20 YEAR RETURN

Asset Class	Policy Target
Public Equity	44.0%
Private Equity	10.0%
Interest Rate Sensitive Bonds	6.0%
Credit	23.0%
Real Estate	17.0%
20 Year Expected Return as of December 31, 2021	7.2%[1]
20 Year Expected Return as of June 30, 2023	7.9%[2]
ASRS Actuarial Rate of Return	7.0%[3]

Note:
Asset allocation approved by the Board on September 30, 2022.
1 – Modeling uses NEPC capital market assumptions and Real Estate uses RCLCo capital market assumptions.
2 - Modeling uses NEPC capital market assumptions as of June, 30, 2023 with ASRS Credit and RCLCo capital market assumptions.
3 - ASRS Actuarial Rate of Return As of July 30, 2021.

UNIVERSE COMPARISON - PERFORMANCE

Total Fund vs. InvMetrics Public DB > $1 Billion

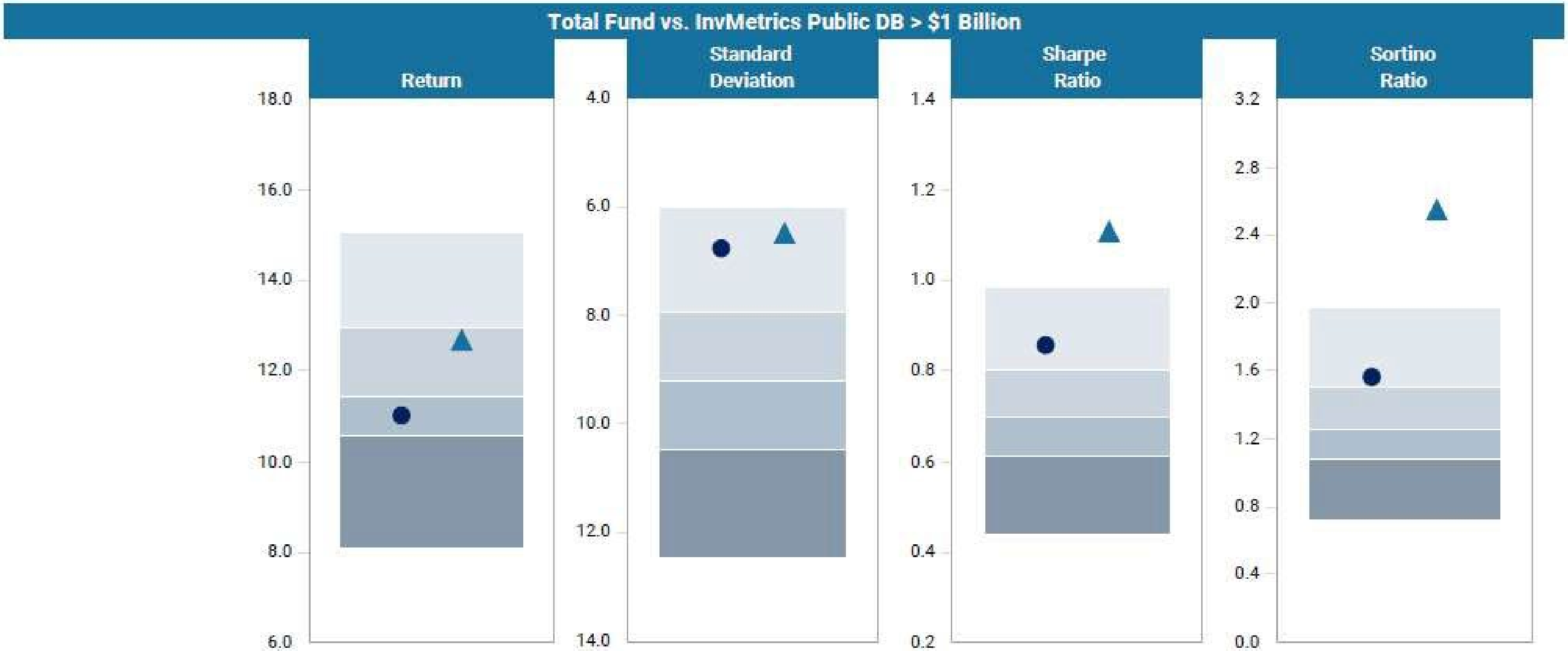


	3 Mo	1 Year	3 Years	5 Years	10 Years	20 Years
● Total Fund	5.33 (82)	11.02 (61)	7.84 (3)	9.50 (12)	7.74 (5)	7.43 (4)
▲ *Interm SAA Policy*	*5.17 (89)*	*12.68 (28)*	*5.93 (17)*	*8.43 (47)*	*6.34 (50)*	*6.61 (43)*
5th Percentile	8.76	15.09	7.48	10.08	7.72	7.43
1st Quartile	7.45	12.92	5.52	8.94	6.89	6.90
Median	6.61	11.43	4.54	8.29	6.34	6.55
3rd Quartile	5.82	10.56	3.77	7.71	5.90	6.09
95th Percentile	4.41	8.07	2.43	6.69	5.36	5.59
Population	94	85	73	70	64	52

Total Fund Ordinal Rank	77	52	2	8	3	2
Interim SAA Policy Ordinal Rank	84	24	12	33	32	22

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns. Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.

UNIVERSE COMPARISON – 1 YEAR



	1 Yr (%)	1 Yr (%)	1 Yr (%)	1 Yr (%)
● Total Fund	11.02 (61)	6.78 (9)	0.86 (16)	1.56 (20)
▲ *Interm SAA Policy*	*12.68 (28)*	*6.51 (7)*	*1.11 (1)*	*2.55 (1)*
5th Percentile	15.09	6.01	0.99	1.98
1st Quartile	12.92	7.93	0.80	1.51
Median	11.43	9.19	0.70	1.26
3rd Quartile	10.56	10.50	0.62	1.09
95th Percentile	8.07	12.47	0.44	0.72
Population	85	85	85	85

Total Fund Ordinal Rank	39	7	14	15
Interim SAA Ordinal Rank	21	21	10	14

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
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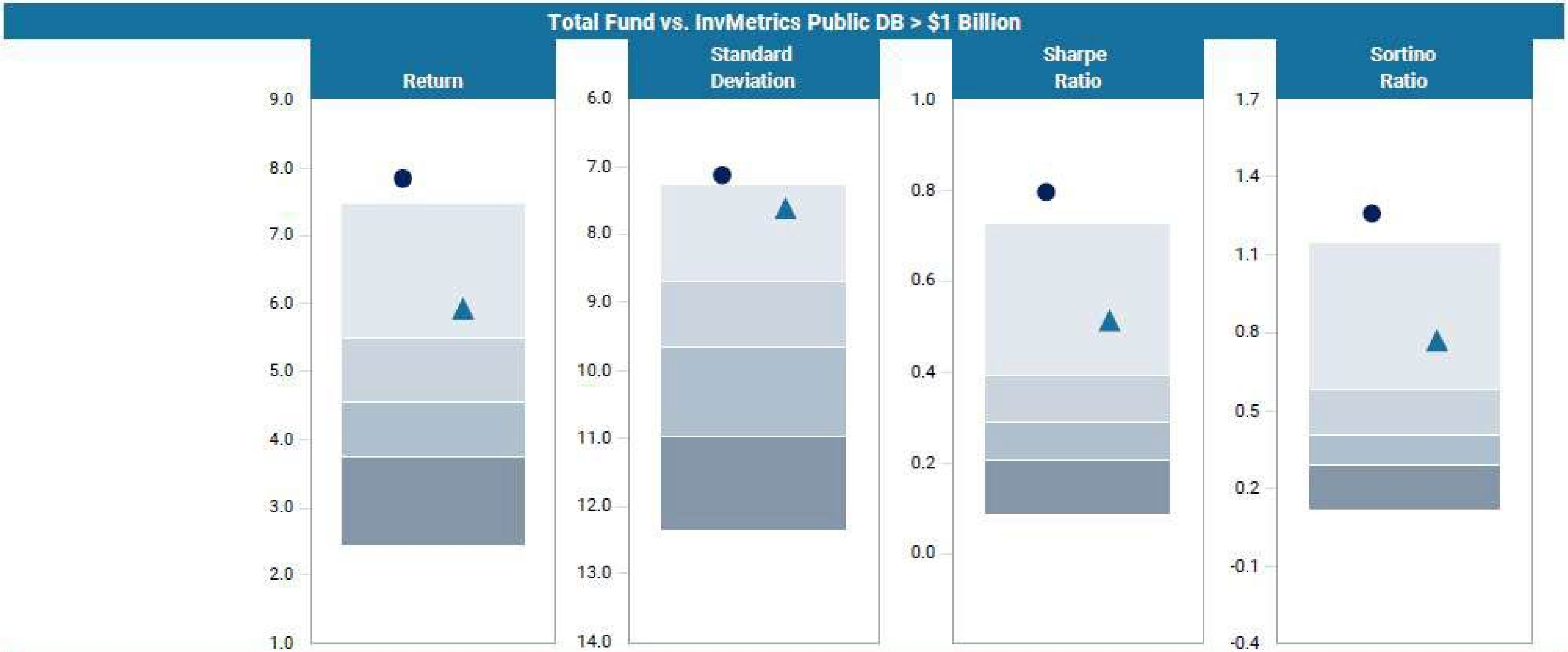
UNIVERSE COMPARISON – 3 YEARS



	3 Yrs (%) Return	3 Yrs (%) Standard Deviation	3 Yrs (%) Sharpe Ratio	3 Yrs (%) Sortino Ratio
● Total Fund	7.84 (3)	7.12 (2)	0.80 (5)	1.26 (5)
▲ *Interm SAA Policy*	*5.93 (17)*	*7.62 (12)*	*0.51 (12)*	*0.77 (13)*
5th Percentile	7.48	7.26	0.73	1.15
1st Quartile	5.52	8.68	0.39	0.58
Median	4.54	9.67	0.29	0.41
3rd Quartile	3.77	10.98	0.21	0.29
95th Percentile	2.43	12.36	0.08	0.12
Population	73	73	73	73
Total Fund Ordinal Rank	4	4	6	6
Interim SAA Ordinal Rank	16	11	12	12

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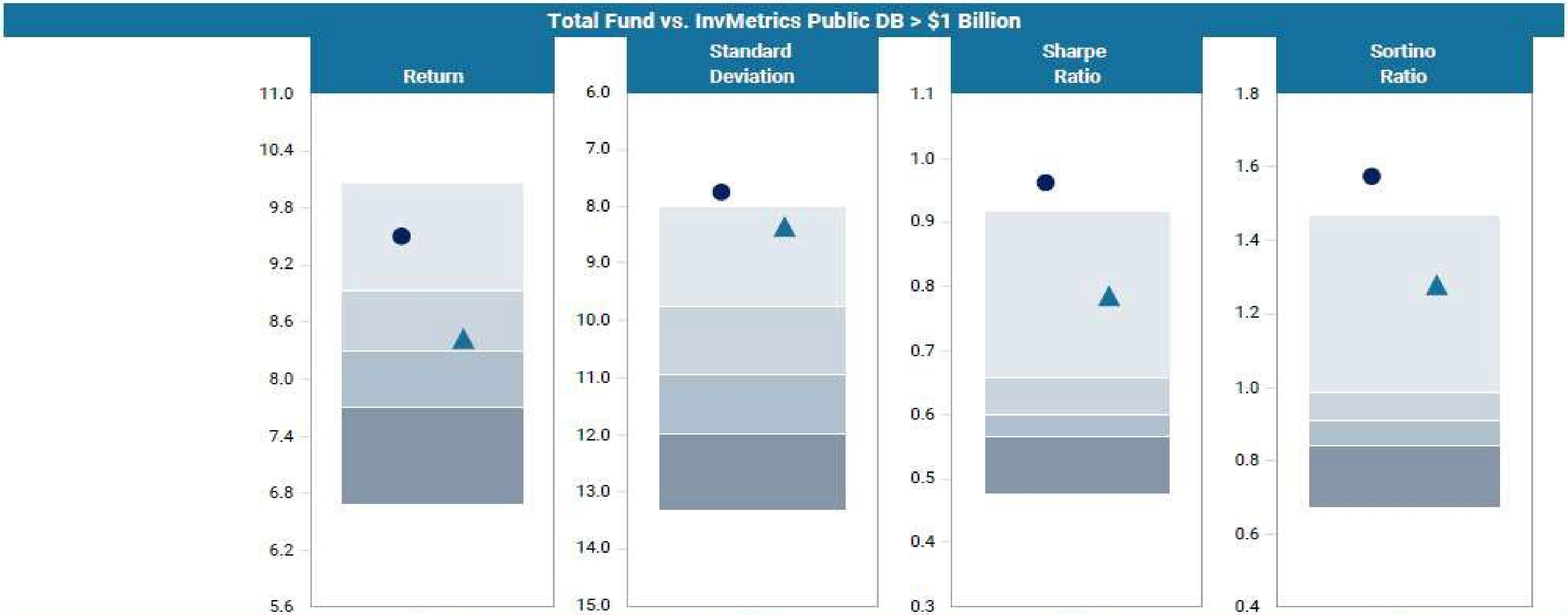
UNIVERSE COMPARISON – 5 YEARS



	Return 5 Yrs (%)	Standard Deviation 5 Yrs (%)	Sharpe Ratio 5 Yrs (%)	Sortino Ratio 5 Yrs (%)
● Total Fund	9.50 (12)	7.75 (2)	0.96 (2)	1.58 (2)
▲ *Interm SAA Policy*	*8.43 (47)*	*8.34 (10)*	*0.78 (15)*	*1.28 (11)*
5th Percentile	10.08	7.99	0.92	1.47
1st Quartile	8.94	9.77	0.66	0.99
Median	8.29	10.95	0.60	0.91
3rd Quartile	7.71	11.99	0.57	0.84
95th Percentile	6.69	13.33	0.48	0.67
Population	70	70	70	70
Total Fund Ordinal Rank	4	2	4	2
Interim SAA Ordinal Rank	15	10	12	10

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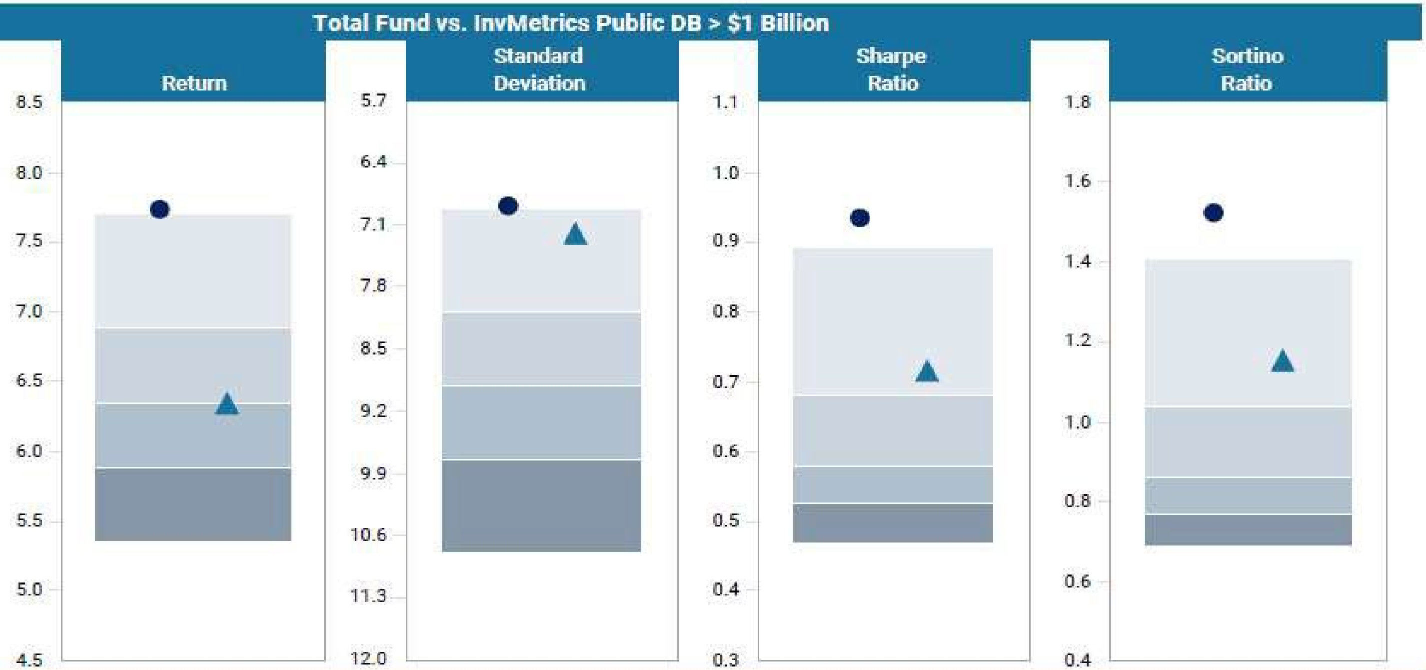
UNIVERSE COMPARISON – 10 YEARS



	Return 10 Yrs (%)	Standard Deviation 10 Yrs (%)	Sharpe Ratio 10 Yrs (%)	Sortino Ratio 10 Yrs (%)
● Total Fund	7.7 (5)	6.9 (3)	0.9 (4)	1.5 (4)
▲ Interm SAA Policy	6.3 (50)	7.2 (10)	0.7 (19)	1.2 (16)
5th Percentile	7.7	6.9	0.9	1.4
1st Quartile	6.9	8.1	0.7	1.0
Median	6.3	8.9	0.6	0.9
3rd Quartile	5.9	9.7	0.5	0.8
95th Percentile	5.4	10.8	0.5	0.7
Population	64	64	64	64

Total Fund Ordinal Rank	4	4	3	2
Interim SAA Ordinal Rank	25	8	14	12

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
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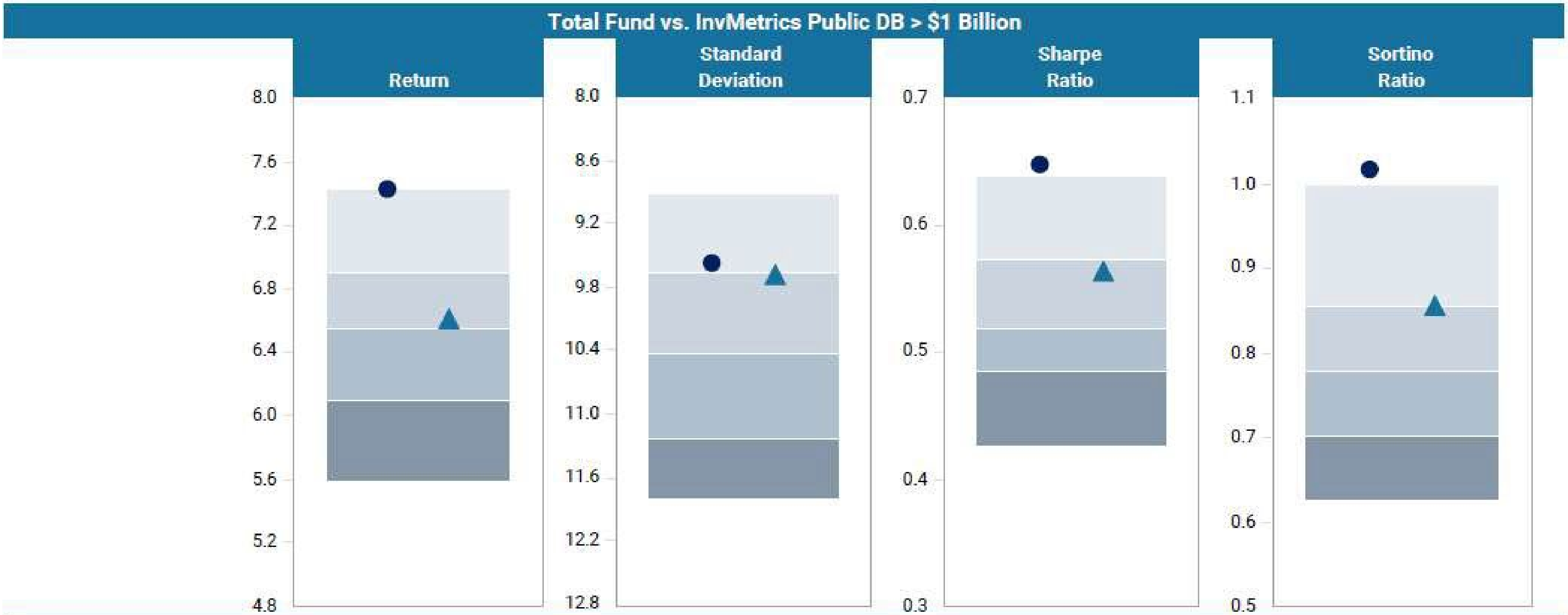
UNIVERSE COMPARISON – 20 YEARS



	20 Yrs (%)	20 Yrs (%)	20 Yrs (%)	20 Yrs (%)
● Total Fund	7.43 (4)	9.57 (21)	0.65 (4)	1.02 (4)
▲ *Interm SAA Policy*	*6.61 (43)*	*9.68 (25)*	*0.56 (27)*	*0.86 (25)*
5th Percentile	7.43	8.92	0.64	1.00
1st Quartile	6.90	9.66	0.57	0.85
Median	6.55	10.42	0.52	0.78
3rd Quartile	6.09	11.23	0.48	0.70
95th Percentile	5.59	11.81	0.43	0.62
Population	52	52	52	52
Total Fund Ordinal Rank	2	11	3	2
Interim SAA Ordinal Rank	11	14	12	11

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.

TOTAL FUND PERFORMANCE NET OF FEES

	Performance (%)													
	3 Mo (%)		1 Yr (%)		3 Yrs (%)		5 Yrs (%)		10 Yrs (%)		80 Quarters Ending Dec-2023		Inception (%)	Inception Date
Total Fund	**5.33**	**(82)**	**11.02**	**(61)**	**7.84**	**(3)**	**9.50**	**(12)**	**7.74**	**(5)**	**7.43**	**(4)**	**9.54**	**Jul-75**
Interm SAA Policy	*5.17*	*(89)*	*12.68*	*(28)*	*5.93*	*(17)*	*8.43*	*(47)*	*6.34*	*(50)*	*6.61*	*(43)*	*9.07*	
Over/Under	0.16		-1.66		1.91		1.07		1.40		0.82		0.47	
InvMetrics Public DB > $1 Billion Median	*6.61*		*11.43*		*4.54*		*8.29*		*6.34*		*6.55*			

ASSET CLASS PERFORMANCE VS. BENCHMARK

	1 Year Return	3 Year Return
Public Equity (TWR)	23.0%	6.2%
Custom Public Equity Benchmark (TWR)	22.8%	6.0%
Excess Return	0.2%	0.2%
Private Equity (TWR)	8.1%	20.0%
Custom Private Equity Benchmark (TWR)	20.5%	7.2%
Excess Return	-12.4%	12.8%
Interest Rate Sensitive (TWR)	4.5%	-3.7%
ASRS Custom IRS Benchmark (TWR)	4.1%	-3.9%
Excess Return	0.4%	0.2%
Credit (TWR)	10.0%	10.4%
Custom Credit Benchmark (TWR)	15.9%	8.7%
Excess Return	-5.9%	1.7%
Real Estate (TWR)	-5.2%	7.3%
NCREIF ODCE Net 1 Qtr. Lag (TWR)	-12.9%	6.2%
Excess Return*	7.7%	1.1%

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

TWR is Time Weighted Return

CASH MANAGEMENT

Month	External CFs	Last day of the Month Ending Balance*
Dec - 22	($25.9)	$1,094.8
Jan - 23	($95.0)	$1,187.6
Feb - 23	($100.0)	$1.108.1
Mar - 23	($60.7)	$1,119.3
Apr - 23	($84.8)	$980.1
May - 23	($60.5)	$1,054.9
Jun - 23	($8.0)	$750.9
Jul - 23	($178.7)	$750.5
Aug - 23	($106.2)	$517.8
Sep - 23	($77.3)	$305.9
Oct - 23	($80.7)	$693.2
Nov - 23	($62.1)	$515.8
Dec - 23	($38.7)	$675.2

*Includes assetized & unassetized cash balances (Inception of 1/26/15); represents monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.

INDEPENDENT OVERSIGHT/ COMPLIANCE

SAA POLICY COMPLIANCE

Assets	Current Mkt Value	Current Allocation	Interim SAAP	Interim SAAP Difference	Policy Range	Within Range	SAAP
Public Equity	$21,586,622,668	40.4%	40.1%	0.3%	34% - 54%	Yes	44%
Private Equity	$6,860,891,194	12.8%	12.7%	0.1%	7% - 13%	Yes	10%
Interest Rate Sensitive	$2,161,269,842	4.0%	5.2%	-1.2%	3% - 12%	Yes	6%
Credit	$12,330,907,280	23.1%	23.0%	0.1%	17% - 26%	Yes	23%
Real Estate	$10,507,384,286	19.6%	18.9%	0.7%	13% - 21%	Yes	17%
Other	$224,041	0.0%		0.0%	0% - 10%	Yes	0%
Cash	$29,898,745	0.1%		0.1%	0% - 5%	Yes	0%
Total	$53,477,198,057	100%	100%				100%

Note:

Values shown for private markets portfolios include cash flows that occurred during Q4 2023.

Total Equity market value includes futures positions profit and loss as well as notional values of futures positions.

Includes values in transition account.

Policy Ranges shown are relative to the long-term SAAP and may cause some asset classes to be out of range while implementation of the long-term SAAP is in process.

Market values include manager held cash.

Arizona State Retirement System

December 31, 2023

PERFORMANCE DETAIL

	Allocation		Performance (%)						
	Market Value ($)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Total Fund	**53,477,198,057**	**100.0**	**5.33 (82)**	**11.02 (61)**	**7.84 (3)**	**9.50 (12)**	**7.74 (5)**	**9.54**	**Jul-75**
Interm SAA Policy			*5.17*	*12.68*	*5.93*	*8.43*	*6.34*	*9.07*	
Over/Under			0.16	-1.66	1.91	1.07	1.40	0.47	
InvMetrics Public DB > $1 Billion Median			*6.61*	*11.43*	*4.54*	*8.29*	*6.34*		
Total Public Equity	**21,586,622,668**	**40.4**	**11.97**	**22.96**	**6.22**	**11.54**	**8.02**	**7.33**	**Jan-98**
ASRS Custom Total Public Equity Benchmark			*11.75*	*22.75*	*5.98*	*11.96*	*8.38*	*7.03*	
Over/Under			0.22	0.21	0.24	-0.42	-0.36	0.30	
Total Domestic Equity	**13,633,622,192**	**25.5**	**12.38**	**26.44**	**8.97**	**14.56**	**11.01**	**11.31**	**Jul-75**
ASRS Custom Domestic Equity Benchmark			*12.14*	*26.25*	*8.75*	*15.36*	*11.68*	*11.50*	
Over/Under			0.24	0.19	0.22	-0.80	-0.67	-0.19	
Total International Equity	**7,953,000,477**	**14.9**	**11.28**	**17.92**	**2.47**	**7.65**	**4.25**	**5.89**	**Apr-87**
ASRS Custom Int'l Equity Benchmark			*11.09*	*17.55*	*2.09*	*7.54*	*4.21*	*5.65*	
Over/Under			0.19	0.37	0.38	0.11	0.04	0.24	
Total Private Equity	**6,860,891,194**	**12.8**	**1.39**	**8.12**	**19.87**	**14.15**	**13.64**	**9.72**	**Jan-08**
ASRS Custom Private Equity Benchmark			*-3.34*	*20.51*	*7.17*	*6.40*	*8.03*	*7.41*	
Over/Under			4.73	-12.39	12.70	7.75	5.61	2.31	
Interest Rate Sensitive Fixed Income	**2,161,269,842**	**4.0**	**5.66**	**4.47**	**-3.65**	**0.94**	**1.86**	**7.09**	**Jul-75**
ASRS Custom IRS Benchmark			*5.66*	*4.05*	*-3.91*	*0.73*	*1.62*		
Over/Under			0.00	0.42	0.26	0.21	0.24		
Credit	**12,330,907,280**	**23.1**	**2.44**	**10.04**	**10.36**	**9.15**	**8.35**	**8.78**	**Oct-12**
Custom Credit Benchmark			*4.09*	*15.85*	*8.72*	*7.06*	*6.15*	*5.97*	
Over/Under			-1.65	-5.81	1.64	2.09	2.20	2.81	
Total Real Estate	**10,507,384,286**	**19.6**	**-0.63**	**-5.15**	**7.25**	**5.52**	**8.68**	**6.10**	**Oct-05**
NCREIF ODCE Net 1 Qtr. Lag			*-2.10*	*-12.88*	*6.19*	*4.72*	*7.19*	*5.98*	
Over/Under			1.47	7.73	1.06	0.80	1.49	0.12	

PUBLIC MARKET ASSET CLASS ANALYSIS

	3 Years Return	3 Years Standard Deviation	3 Years Tracking Error	3 Years Information Ratio	3 Years Jensen Alpha	3 Years Beta	3 Years Sharpe Ratio
Total Public Equity	6.22	16.69	0.20	1.14	0.22	1.00	0.32
ASRS Custom Total Public Equity Benchmark	5.98	16.67	0.00		0.00	1.00	0.30
Total Domestic Equity	8.97	17.82	0.17	1.20	0.19	1.00	0.45
ASRS Custom Domestic Equity Benchmark	8.75	17.78	0.00		0.00	1.00	0.44
Total International Equity	2.47	16.49	0.43	0.84	0.36	1.00	0.10
ASRS Custom Int'l Equity Benchmark	2.09	16.52	0.00		0.00	1.00	0.08
Interest Rate Sensitive Fixed Income	-3.65	6.67	0.23	1.13	0.18	0.99	-0.86
ASRS Custom IRS Benchmark	-3.91	6.75	0.00		0.00	1.00	-0.89

	5 Years Return	5 Years Standard Deviation	5 Years Tracking Error	5 Years Information Ratio	5 Years Jensen Alpha	5 Years Beta	5 Years Sharpe Ratio
Total Public Equity	11.54	18.43	0.57	-0.63	-0.43	1.01	0.58
ASRS Custom Total Public Equity Benchmark	11.96	18.30	0.00		0.00	1.00	0.61
Total Domestic Equity	14.56	19.52	1.02	-0.61	-0.86	1.02	0.70
ASRS Custom Domestic Equity Benchmark	15.36	19.18	0.00		0.00	1.00	0.74
Total International Equity	7.65	17.95	0.45	0.17	0.14	0.99	0.40
ASRS Custom Int'l Equity Benchmark	7.54	18.11	0.00		0.00	1.00	0.39
Interest Rate Sensitive Fixed Income	0.94	5.78	0.20	1.02	0.20	0.99	-0.13
ASRS Custom IRS Benchmark	0.73	5.84	0.00		0.00	1.00	-0.17

PRIVATE MARKETS PERFORMANCE - IRR

AS OF SEPTEMBER 30, 2023

	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)
Private Equity (IRR)	**0.4**	**7.7**	**19.8**	**14.4**	**13.7**	**13.5**
Credit (IRR)	**2.4**	**9.9**	**10.6**	**9.6**	**9.8**	**9.8**
Real Estate (IRR)	**-1.0**	**-5.1**	**7.2**	**5.5**	**7.9**	**7.3**

Source: BNY Mellon/ Burgiss

ASSET CLASS COMMITTEE MEETINGS

FIDUCIARY OVERSIGHT

Six Combined Asset Class Committee Meetings were convened since the last time NEPC provided an update.

- **November 28, 2023– Combined Asset Class Committee**
  - Real Estate Asset Class Implementation Plan
    - ☐ Staff and extension consultant recommendation to approve the 2024 Real Estate Asset Class Implementation Plan
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation
  - Private Equity Asset Class Implementation Plan
    - ☐ Staff recommendation to approve the 2024 Private Equity Asset Class Implementation Plan
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation
  - Public Equity Asset Class Implementation Plan
    - ☐ Staff recommendation to approve the 2024 Public Equity Asset Class Implementation Plan
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

- **December 6, 2023– Combined Asset Class Committee**
  - Real Estate manager recommendation ($100mm)
    - ☐ Staff and extension consultant recommendation to commit new capital to an existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

ASSET CLASS COMMITTEE MEETINGS

FIDUCIARY OVERSIGHT

- **January 17, 2024 – Combined Asset Class Committee**
  - Credit manager recommendation ($400mm)
    - ☐ Staff and extension consultant recommendation to commit new capital to a new investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation
  - Credit manager recommendation ($400mm)
    - ☐ Staff recommendation to renew a capital commitment to an existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation
  - Real Estate manager recommendation
    - ☐ Staff and extension consultant recommendation to sell an asset
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

- **January 24, 2024 – Combined Asset Class Committee**
  - Private Equity manager recommendation
    - ☐ Staff recommendation to approve rolling 100% of ASRS interests within an existing investment manager relationship and commit an estimated 7% additional capital to an investment within the existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

ASSET CLASS COMMITTEE MEETINGS

FIDUCIARY OVERSIGHT

- **February 6, 2024 – Combined Asset Class Committee**
  - Credit manager recommendation ($50mm)
    - ☐ Staff recommendation to approve commitment of new capital with an existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

- **February 13, 2024 – Combined Asset Class Committee**
  - Private Equity manager recommendation ($75mm)
    - ☐ Staff and extension consultant recommendation to approve commitment of new capital with an existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

- **February 20, 2024 – Combined Asset Class Committee**
  - Credit manager recommendation
    - ☐ Staff recommendation to approve reallocation of capital within an existing investment manager relationship
    - ☐ Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - ☐ Committee approved the recommendation

GENERAL OBSERVATIONS

- **The newly approved Strategic Asset Allocation went into effect as of October 1, 2022**
  - Staff is executing against strategic plans to achieve SAAP asset class targets
- **Staff continues to seek to optimize the plan's assets through equitizing cash balances**
- **Public Equity is driving strong absolute returns in the last year and is outperforming its benchmark**
  - Both Domestic and International equity are outperforming in the last year
  - Staff is executing well against the Public Equity Strategic Plan
- **Private markets are outperforming over the longer-term and driving outperformance against the Interim SAAP**
  - Private Equity program has contributed positively in benchmark-relative terms
  - Credit continues to outperform its benchmark and continues to provide the Plan with strong yield characteristics
  - Real Estate is contributing positively to relative performance over the last 10 years and the program has not participated fully in the broader market's declines
- **Current positioning is consistent with IMD House Views and strategic implementation plans**
  - Real Estate is overweight relative to SAAP. The Strategic Plan calls for a reduction in the allocation to policy over several years
  - Private Equity is overweight its SAAP target range
  - Current underweight position in Interest Rate Sensitive assets and Public Equity is consistent with the market movement and IMD house views

INDEPENDENT OVERSIGHT/ COMPLIANCE: LTD

PERFORMANCE SUMMARY
LONG-TERM DISABILITY

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception (July-02)
Long Term Disability	5.4%	11.0%	7.8%	9.5%	7.5%	7.2%
LTD SAA Policy[1]	5.2%	12.7%	5.9%	8.4%	6.8%	7.0%
Excess Return	0.2%	-1.7%	1.9%	1.1%	0.7%	0.2%

1 - LTD SAA Policy composition can be found in the appendix.
Note: Excess returns are rounded to one decimal point.
LTD portfolio returns sourced from BNY Mellon.

APPENDIX

SAA POLICY HISTORY

STRATEGIC ASSET ALLOCATION POLICY HISTORY

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.[1]/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- 7/1/2012 – 3/31/2015 – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index
- 4/1/2015 – 3/31/2017 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index
- 4/1/2017 – 6/30/2018 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/2% Barclays Capital High Yield/12% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index
- 7/1/2018 – 9/30/2022 – 40% MSCI ACWI IMI Net w/ USA Gross, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 20% NCREIF ODCE, 20% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 10% Barclays US Capital Aggregate
- 10/1/2022 – 7/31/2023 – 44% MSCI ACWI IMI Net w/ USA Gross, 10%, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 17% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 6% ASRS Custom IRS (Interest Rate Sensitive) Benchmark
- 10/1/2022 – Present – 44% MSCI ACWI IMI Custom, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 17% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 6% ASRS Custom IRS (Interest Rate Sensitive) Benchmark

***Interim SAA Policy: 40.13% MSCI ACWI IMI Custom, 12.73% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 5.23% ASRS Custom IRS (Interest Rate Sensitive) Benchmark, 18.92% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)**

Note: Interim SAA Policy includes proration of a total of Interest Rate Sensitive, Public Equity, Private Equity and Real Estate. Unfunded amounts were allocated 83.3% to Equity and 16.7% to Interest Sensitive Fixed Income.

Note: All International MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

LONG-TERM DISABILITY STRATEGIC ASSET ALLOCATION POLICY HISTORY

- 7/1/2002 – 12/31/2004 - 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate Bond Index
- 1/1/2005 – 2/28/2007 - 53% Russell 3000/15% MSCI EAFE/26% Barclays Capital Aggregate Bond Index/6% DJ Wilshire Real Estate Securities Index
- 3/1/2007 – 12/31/2010 - 50% Russell 3000/18% MSCI EAFE/26% Barclays Capital Aggregate Bond Index/6% DJ Wilshire Real Estate Securities Index
- 1/1/2011 – 12/31/2012 - 40% Russell 1000/7% Russell 2000/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% DJ Wilshire Real Estate Securities Index/3% Bloomberg Commodity Index
- 1/1/2013 – 2/28/2016 - 34% Russell 1000/6% Russell 2000/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/13% Barclays Capital Aggregate/8% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/8% DJ Wilshire Real Estate Securities Index/4% Bloomberg Commodity Index
- 2/29/2016 – 7/26/2017 - 24% Russell 1000/12% Russell 2000/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/19% Barclays Capital Aggregate/7% Barclays Capital High Yield/11% DJ Wilshire Real Estate Securities Index/2% Bloomberg Commodity Index
- 7/27/2017 – 6/30/2018 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/2% Barclays Capital High Yield/12% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index
- 7/1/2018 – 9/30/2022 – 40% MSCI ACWI IMI Net w/ USA Gross, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 20% NCREIF ODCE, 20% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 10% Barclays US Capital Aggregate
- 10/1/2022 – 7/31/2023 – 44% MSCI ACWI IMI Net w/ USA Gross, 10%, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 17% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 6% ASRS Custom IRS (Interest Rate Sensitive) Benchmark
- 7/31/2023 – present - 44% MSCI ACWI IMI Custom, 10% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 17% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 6% ASRS Custom IRS (Interest Rate Sensitive) Benchmark

***Interim SAA Policy: 40.13% MSCI ACWI IMI Custom, 12.73% MSCI ACWI IMI Net w/ USA Gross 1 Quarter Lagged, 5.23% ASRS Custom IRS (Interest Rate Sensitive) Benchmark, 18.92% NCREIF ODCE, 23% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)**

Note: All International MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

STRATEGIC ASSET ALLOCATION POLICY HISTORY

- **ASRS Custom Total Public Equity Benchmark** was 77% S&P 500, 23% MSCI EAFE through 12/31/1999; 76% S&P 500, 24% MSCI EAFE through 9/30/2003; 78% S&P 500, 22% MSCI EAFE/ACWI ex-U.S.[1] through 12/31/2006; 49% S&P 500, 11% S&P 400, 11% S&P 600, 29% MSCI ACWI ex-U.S. through 10/31/2009; 48% S&P 500, 10% S&P 400, 10% S&P 600, 23% MSCI EAFE, 4% MSCI EAFE Small Cap, 5% MSCI Emerging Markets through 6/30/2012; 41% S&P 500, 9% S&P 400, 9% S&P 600, 25% MSCI EAFE, 5% MSCI EAFE Small Cap, 11% MSCI Emerging Markets through 3/31/2015; 40% S&P 500, 6% S&P 400, 6% S&P 600, 34% MSCI EAFE, 4% MSCI EAFE Small Cap, 10% MSCI Emerging Markets through 6/30/2018; MSCI ACWI IMI w/USA Gross (Net) through 7/31/2023; MSCI ACWI IMI Custom thereafter.
- **ASRS Custom Domestic Equity Benchmark** was S&P 500 through 12/31/2006; 74% S&P 500, 13% S&P 400, 13% S&P 600 through 12/31/2010; 70% S&P 500, 15% S&P 400, 15% S&P 600 through 3/31/2015.; 77% S&P 500, 11.5% S&P 400, 11.5% S&P 600 through 6/30/2018; 100% MSCI USA IMI thereafter.
- **ASRS Custom Domestic Large Cap Equity Benchmark** was the S&P 500 Index through 6/30/2018; MSCI USA Large Cap Index thereafter.
- **ASRS Custom Domestic Mid Cap Equity Benchmark** was the S&P 400 Index through 6/30/2018; MSCI USA Mid Cap Index thereafter.
- **ASRS Custom Small Cap Equity Benchmark** was the Russell 2000 Index through 12/31/2006; S&P 600 Index through 6/30/2018; MSCI USA Small Cap Index thereafter.
- **ASRS Custom International Equity Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 72% MSCI EAFE, 11% MSCI EAFE Small Cap and 17% MSCI Emerging Markets through 6/30/2012; 61% MSCI EAFE, 13% MSCI EAFE Small Cap and 26% MSCI Emerging Markets through 3/31/2015; 71% MSCI EAFE, 8% MSCI EAFE Small Cap and 21% MSCI Emerging Markets through 6/30/2018; MSCI ACWI IMI ex USA through 7/31/2023; MSCI ACWI IMI ex USA Custom thereafter.
- **ASRS Custom Private Equity Benchmark** was the Russell 2000 Index 1 quarter lagged from inception to 6/30/2018; MSCI ACWI IMI Net w/ USA Gross 1 quarter lagged thereafter.
- **Custom Credit Benchmark** was 42% BBG US High Yield Index, 25% S&P LSTA Index lagged 1 quarter + 2.50%, 33% JP Morgan GBI-EM Global Diversified from 7/1/2012-3/31/2015; 29% BBG US High Yield Index, 71% S&P LSTA Index lagged 1 quarter + 2.50% from 4/1/2015-3/31/2017; 14% BBG US High Yield Index, 86% S&P LSTA Index lagged 1 quarter + 2.50% from 4/1/2017-6/30/2018; 100% S&P LSTA Index lagged 1 quarter + 2.50% thereafter
- **ASRS Custom IRS (Interest Rate Sensitive) Benchmark** was Bloomberg US Aggregate Bond Index from inception to 11/14/2022; Bloomberg US Treasury Index from 11/15/2022 thereafter

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All International MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

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