Commonwealth of Pennsylvania
Public School Employees' Retirement System

DATE: August 19, 2016

SUBJECT: Proposed Revisions to Investment Policy Statement, Objectives, and Guidelines

TO: Members of the Board

FROM: James H. Grossman, Jr., CPA, CFA
Chief Investment Officer

At the September Board meeting, we will recommend that the Board adopt the following changes to Exhibits B, C, D, and E of the Investment Policy Statement, Objectives and Guidelines (IPS) in conjuction with staff and Aon Hewitt's recommendations for the asset allocation. While the asset/liability study supported that the existing allocation is efficient, enhancements to the Current and Long-Term Allocation Targets are being recommended. Below are descriptions of the material changes being recommended.

Exhibit B – Long-Term Target Allocation

Recommend the following enhancement to the Long-Term Target Allocation, previously called the 10-Year Target Allocation (if an asset class is not shown, it means no changes to the target are being recommended):

	Old Target	New Target	Change
Publicly-traded Global Equity	22.5%	20.0%	(2.5%)
Investment Grade	8.5%	11.0%	2.5%
Credit Related	8.0%	10.0%	2.0%
Inflation Protection	12.0%	15.0%	3.0%
Infrastructure	5.0%	8.0%	3.0%
Real Estate	12.0%	10.0%	(2.0%)
Leverage	(14.0%)	(20.0%)	(6.0%)*

* represents an increase in leverage

The old target represents the 10-Year Target Allocation as approved by the Board last year. The proposed changes have the effect of slightly increasing the expected return over the next 30 years by 7 bps (from 7.08% to 7.15%) while slightly increasing the risk by 13 bps (from 11.01% to 11.14%) from the old target. The changes to the Long-Term Target Allocation achieves the goal of both increasing the expected return while at the same time increasing the diversification of the Fund.

In addition to the target allocation changes, staff also revised the Policy Ranges accordingly. The one material change to the policy ranges was in Net Leverage where the low end of the range was increased to 10.0% from 0.0% and the high end of the range was increased from (22.0%) to (30.0%). The low end of the range was adjusted to provide flexibility in raising cash/reducing overall risk exposure. The high end was adjusted due to the higher target Net Leverage as well as to provide additional flexibility, expecially as it relates to the Opportunity Allocation.

Exhibit C – Current Target Allocation

Staff would like to migrate to the new Long-Term Target Allocation in a measured and prudent way. Movement to the Long-Term Target Allocation will take place in more than one step. The first step is taken with the adoption of the revised Current Target Allocation. Staff and Aon recommend the following enhancement to the Current Target Allocation effective October 1, 2016:

	Old Target	New Target	Change
Publicly-traded Global Equity	22.5%	19.0%	(3.5%)
Private Markets	15.0%	16.0%	1.0%
Investment Grade	8.5%	9.0%	0.5%
Credit Related	8.0%	9.0%	1.0%
Inflation Protection	12.0%	15.0%	3.0%
Infrastructure	5.0%	6.0%	1.0%
Leverage	(14.0%)	(17.0%)	(3.0%)*

* represents an increase in leverage

Comments on some of the changes follow:

- Decrease Publicly-traded Global Equity by 3.5% to 19.0% since the proposed total equity exposure is 35.0% and currently there is 16.0% in private equity exposure, the difference of 19.0% is in Publicly-traded Global Equity.
- Increase Private Market Equity Exposure by 1.0% to 16.0% since our current exposure is 16.0%; expect the allocation to fall over time to the Long-Term Target Allocation as the Fund receives net distributions from the program;
- Increase Credit Related fixed income by 1.0% to 9.0% accomplished by increasing high yield debt from 6.0% to 8.0% and decreasing emerging market debt from 2.0% to 1.0%;
- Increase Inflation Protection fixed income (TIPS) by 3.0% to 15.0% to increase the Fund's diversification into assets positively impacted by increasing inflation;
- Increase Infrastructure by 1.0% to 6.0%; the increase will be accomplished through investing in infrastructure other than Master Limited Partnerships (MLPs). Note that MLPs would be moved into the broader asset class of Infrastructure with adoption of the recommended allocation; and
- Increase Leverage from 14.0% to 17.0% (leverage net of cash increases from 11.0% to 14.0%).

The proposed changes have the effect of slightly increasing the expected return by 2 bps (7.08% to 7.10%) while slightly decreasing risk by 11 bps (11.01% to 10.90%) from the old target.

In addition to the target allocation changes, staff also revised the Policy Ranges accordingly. The one material change to the policy ranges was in Net Leverage where the low end of the range was increased to 10.0% from 0.0% and the high end of the range was increased from (22.0%) to (28.0%). The low end of the range was adjusted to provide flexibility in raising cash/reducing overall risk exposure. The high end was adjusted due to the higher target Net Leverage as well as to provide additional flexibility, expecially as it relates to the Opportunity Allocation. A minor adjustment was made to the Absolute Return Policy Range of decreasing the minimum by 1.0% to 5.0% and increasing the maximum by 1.0% to 15.0%.

Exhibit D – Policy Index

The Policy Index weights were adjusted in accordance with the recommendations presented by Aon Hewitt in their presentation to the Board and are consistent with the recommended changes to Exhibit C. Only the Policy Weights were changed, not the Policy Indexes.

Exhibit E – Public Market Investment Manager Target Ranges

Recommend numerous changes to Target Capital Ranges as a Percentage of the Total Fund to primarily allow for increased internal management in various asset classes as follow:

- Increase the maximum in Internally Managed S&P 400 Index from 2.5% to 5.0%;
- Increase the maximum in Internally Managed S&P 600 Index from 2.5% to 5.0%;
- Increase the maximum in Internally Managed U.S. Long Treasuries from 1.0% to 3.0%;
- Increase the maximum in Internally Managed U.S. TIPS from 8.0% to 20.0%;
- Increase the maximum in Internally Managed U.S. Master Limited Partnership Index from 4.0% to 5.0%;
- Increase the maximum in Internally Managed Infrastructure Index Portfolio from 2.0% to 5.0%;
- Increase the maximum in Internally Managed Risk Parity Portfolio from 5.0% to 15.0%; and
- Increase the maximum in Internally Managed LIBOR-Plus Short-Term Investment Pool from 8.0% to 10.0%.

Also recommend additional changes related to external managers as follows:

- Increase the maximum in U.S. and Non-U.S. TIPS from 6.0% to 8.0% due to an increase in the overall TIPS allocation from 12.0% to 15.0%;
- Increase the maximum in Externally Managed Short Duration Non-Agency RMBS Portfolios from 1.0% to 2.0% to provide additional flexibility should

opportunities to generate additional excess returns (alpha) present themselves in the future; and

Blacklined and clean copies to each guideline have been included in the package for your review.

If you have any questions or comments, please contact me at 717-720-4703.

Exhibit B – Long-Term Target Allocation

The Long-Term Target Allocation shown below represents the long-term strategic allocation that is intended to be achieved over a period beyond the next year. In addition to maintaining an attractive risk-adjusted return profile, it takes into consideration the liquidity needs of PSERS, particularly relative to the current allocation to illiquid asset classes, which typically cannot be changed prudently in the short term. The Current Target Allocation (Exhibit C) represents the target allocation against which the PSERS portfolio will be managed commencing October 1, 2016. For the purposes of performance reporting and measurement, the focus is on the Current Target Allocation. Staff and the Investment Consultant reexamine the Current Target Allocation on an annual basis and present to the Board recommended changes, as needed, based on changing liquidity circumstances and opportunities in the marketplace.

	Long-Term Target Allocation	Policy Range Low	Policy Range High
Equity Exposure			
Publicly-traded Global Equity	20.00%		
Private Markets	15.00%		
Total Equity Exposure	**35.00%**	**25.00%**	**45.00%**
Fixed Income Exposure			
Investment Grade	11.00%		
Credit-Related	10.00%		
Inflation Protected	15.00%		
Total Fixed Income Exposure	**36.00%**	**26.00%**	**46.00%**
Real Asset Exposure			
Infrastructure	8.00%		
Commodities	8.00%		
Real Estate	10.00%		
Total Real Asset Exposure	**26.00%**	**16.00%**	**36.00%**
Risk Parity	**10.00%**	**5.00%**	**15.00%**
Absolute Return	**10.00%**	**5.00%**	**15.00%**
Opportunity Allocation[1]	**0.00%**	**0.00%**	**5.00%**
Net Leverage			
Cash	3.00%		
Leverage	(20.00%)		
Net Leverage	**(17.00%)**	**10.00%**	**(30.00%)**
TOTAL	**100.00%**		

The Policy Ranges for the Target Allocation represent rebalancing triggers and tactical allocation constraints around the target allocations.

For purposes of this analysis, cash and cash equivalents held in each Investment Manager's portfolio will be considered fully invested based on that advisor's objectives (i.e. cash in an equity Investment Manager's account will be considered as part of the Publicly-traded Global Equity in the table above). For classification purposes, cash equivalents include fixed income securities maturing in less than one year.

[1]The Opportunity Allocation is reserved for attractive or innovative strategies that may not fit into the Current or Long-Term Target Allocation but offer a compelling return enhancement and/or diversification benefit (risk reduction). Funding for these investments may come from any other part of the asset allocation, including leverage.

Exhibit C – Current Target Allocation

The current long-term, top-down Target Allocation of the Board, based on the market value of the System's assets as of October 1, 2016, subject to the provisions discussed below:

	Cash Markets	Leverage	Current Target Allocation	Policy Range Low	Policy Range High
Equity Exposure					
Publicly-traded Global Equity	19.00%		19.00%		
Private Markets	16.00%		16.00%		
Total Equity Exposure	**35.00%**	**0.00%**	**35.00%**	**25.00%**	**45.00%**
Fixed Income Exposure					
Investment Grade	6.00%	3.00%	9.00%		
Credit-Related	9.00%		9.00%		
Inflation Protected	7.00%	8.00%	15.00%		
Total Fixed Income Exposure	**22.50%**	**10.50%**	**33.00%**	**23.00%**	**43.00%**
Real Asset Exposure					
Infrastructure	5.50%	0.50%	6.00%		
Commodities	4.00%	4.00%	8.00%		
Real Estate	11.50%	0.50%	12.00%		
Total Real Asset Exposure	**21.00%**	**5.00%**	**26.00%**	**16.00%**	**36.00%**
Risk Parity	**9.00%**	**1.00%**	**10.00%**	**5.00%**	**15.00%**
Absolute Return	**10.00%**		**10.00%**	**5.00%**	**15.00%**
Opportunity Allocation[1]	**0.00%**		**0.00%**	**0.00%**	**5.00%**
Net Leverage					
Cash	3.00%		3.00%		
Financing Cost of Leverage		(17.00%)	(17.00%)		
Net Leverage	**3.00%**	**(17.00%)**	**(14.00%)**	**10.00%**	**(28.00%)**
TOTAL	**100.00%**	**0.00%**	**100.00%**		

Cash markets represent investments which are fully-funded by cash. Leverage represents economic exposures obtained generally through derivative exposure, other forms of financing, or leveraged funds. For example, exposure to Gold can be obtained with very little cash through the swap market.

The portfolio will be managed against the Current Target Allocation shown in the table above. The use of leverage within asset classes as shown reflects how leverage is currently deployed within the PSERS portfolio. It is not intended to be a target leverage allocation. Staff continually monitors the marketplace for opportunities to improve portfolio efficiency. Leverage may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the Policy Range and maximum net leverage permissible under this Policy.

The Policy Ranges for the Asset Allocation represent rebalancing triggers and tactical allocation constraints around the target allocations.

For purposes of this analysis, cash and cash equivalents held in each Investment Manager's portfolio will be considered fully invested based on that advisor's objectives (i.e. cash in an equity Investment Manager's account will be considered as part of the Publicly-traded Global Equity in the table above). For classification purposes, cash equivalents include fixed income securities maturing in less than one year.

[1]The Opportunity Allocation is reserved for attractive or innovative strategies that may not fit into the Current or Long-Term Target Allocation but offer a compelling return enhancement and/or diversification benefit (risk reduction). Funding for these investments may come from any other part of the asset allocation, including leverage.

Exhibit D – Policy Index

The Board adopts the following weighted policy benchmarks to measure the performance of the System beginning October 1, 2016, subject to footnotes 1 & 4:

	Policy Weight	
Equity Exposure		
Publicly-traded Global Equity		
MSCI USA IMI Gross Index	7.40%[1]	
MSCI ACWI Ex USA IMI with Developed Market Currencies (75% Hedged to USD) Index Net	11.10%	
MSCI Emerging Markets Index Net	0.50%	
Private Markets		
Burgiss Median, one-quarter lagged[2]	16.00%[1]	
Total Equity Exposure		**35.00%**
Fixed Income Exposure		
Investment Grade		
Barclays Capital U.S. Aggregate Index	5.00%	
Barclays Capital Global Aggregated GDP-weighted Developed Market ex-U.S. (Hedged to USD) Index	1.00%	
Barclays Capital U.S. Aggregate Long Treasury Index	3.00%	
Credit-Related		
Barclays Capital EM Local Currency – Government - MV Weighted (Unhedged) - 10% Country Cap Index	1.00%	
Barclays Capital U.S. High Yield Index	8.00%	
Inflation Protected		
Barclays Capital World Government Inflation-Linked Bond Index (Hedged to USD)	15.00%	
Total Fixed Income Exposure		**33.00%**
Real Asset Exposure		
Infrastructure		
S&P MLP Index	4.00%	
FTSE Developed Core Infrastructure 50/50 (Hedged to USD) Index Net	2.00%	
Commodities		
Bloomberg Commodity Index	5.00%	
Bloomberg Commodity Gold Subindex	3.00%	
Real Estate		
Private		
NFI and Burgiss Median, one- quarter lagged[3]	11.00%[4]	
Publicly-traded		
FTSE EPRA/NAREIT Developed Index (Hedged to USD) Net	1.00%[4]	
Total Real Asset Exposure		**26.00%**

Risk Parity		
Custom Benchmark[5]		**10.00%**
Absolute Return		
3-Month LIBOR + 3.50%		**10.00%**
Net Leverage		
Cash		
Merrill Lynch U.S. Treasury Bill 0 - 3 Months	3.00%	
Financing Cost of Leverage[6]		
3-Month LIBOR	(17.00%)	
Net Leverage		**(14.00%)**
TOTAL		**100.00%**

[1] As the Private Markets allocation is funded (or distributions received) and/or the allocation increases/decreases due to the total market value of the Fund changing, the Publicly-traded Global Equity policy weight (specifically, the combination of MSCI USA IMI Gross Index and MSCI ACWI Ex USA IMI with Developed Market Currencies hedged to USD Index policy weights) will be proportionately and conversely revised to reflect these changes using a 60-40 split between the ex. USA (60%) and USA (40%) indices. For example, if the allocation to Private Markets increases by 100 basis points due to a change in the market value of the total Fund in the fourth quarter, then starting with the first quarter the policy weight will include this 100 basis points increase in the Private Markets benchmark and the Publicly-traded Global Equity policy weights will also be proportionately reduced by 100 basis points. Adjustments to the Private Markets policy weight will be completed in 50 basis point increments (adjustment will be made to the nearest 0.50%) on a quarterly basis.

[2] The benchmark returns are calculated on a weighted vintage year (VY) basis using median VY returns obtained from Burgiss that accounts for the timing of commitments made by the System.

[3] PSERS weights each of the real estate investment strategies actual net asset values of the System's private real estate investments quarterly to produce a customized, blended benchmark return. The NFI-ODCE (NCREIF Open-end Diversified Core Equity) is used for the core strategy whereas returns for value-added and opportunistic strategies are calculated on a weighted vintage year (VY) basis using median VY returns obtained from Burgiss that accounts for the timing of commitments made by the System. This provides a single blended Real Estate policy benchmark return for the System.

[4] As the Private Real Estate allocation is funded (or distributions received) and/or the allocation increases/decreases due to the total market value of the Fund changing, the Publicly-traded Real Estate policy weight will be proportionately and conversely revised to reflect these changes. For example, if the allocation to Private Real Estate increases by 100 basis points due to a change in the market value of the total Fund in the fourth quarter, then starting with the first quarter the policy weight will include this 100 basis points increase in the Private Real Estate benchmark and the Publicly-traded Real Estate policy weight will also be proportionately reduced by 100 basis points. Adjustments to the Private Real Estate policy weight will be completed in 50 basis point increments (adjustment will be made to the nearest 0.50%) on a quarterly basis.

[5] Custom benchmark is structure as follows: MSCI ACWI ($Net) (50%); Barclays Capital U.S. Treasury Index (75%); Barclays Capital World Inflation Linked Bond Index Hedged (55%); Bloomberg Commodity Index (Total Return) (15%); Bloomberg Gold Subindex (5%); and 3-Month LIBOR (-100%).

[6] Financing Cost of Leverage represents the amount of leverage embedded in the asset allocation. Financing may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the policy range and maximum net leverage permissible under this Policy.

Exhibit E – Public Market Investment Manager Target Ranges

All allocations to individual Investment Manager portfolios shall be subject to the limits established by the Board through the Current Target Allocation in **Exhibit C**. IOS is permitted to manage the allocation of capital to each Investment Manager portfolio within the target ranges to public market Investment Manager portfolios of the total fund noted below. The CIO shall have discretion on the timing of reducing any Investment Manager portfolio exceeding the maximum ranges approved below. However, the CIO is not permitted to allocate additional capital to those portfolios currently above the target ranges.

	Target Capital Ranges as a Percentage of the Total Fund
Equity Portfolios:	
Public Markets U.S. Equity Portfolios	
Internally Managed S&P 500 Index	0.0% - 20.0%
Internally Managed S&P 400 Index	0.0% - 5.0%
Internally Managed S&P 600 Index	0.0% - 5.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 5.0%
Public Markets Non-U.S. Equity Portfolios	
Internally Managed MSCI ACW Index ex. U.S.	0.0% - 15.0%
Internally Managed MSCI World Small Cap Index ex. U.S.	0.0% - 2.5%
Internally Managed MSCI Emerging Markets Index	0.0% - 2.5%
Non-U.S. Equity	0.0% - 2.5%
Non-U.S. Small Cap Equity	0.0% - 1.0%
Emerging Markets Equity	0.0% - 1.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 5.0%
Fixed Income Portfolios:	
Investment Grade Portfolios	
Internally Managed U.S. Core Fixed Income	0.0% - 5.0%
U.S. Core Plus or Non-U.S. Developed Fixed Income	0.0% - 3.0%
Internally Managed U.S. Long Treasuries0.0% - 3.0%	
Internally Managed Synthetic Beta Replication[1]	0.0% - 5.0%
Credit-Related Portfolios	
Emerging Market Fixed Income	0.0% - 1.5%
U.S. High Yield Fixed Income	0.0% - 2.0%
Specialty Finance Debt Strategy	0.0% - 1.0%
Multi-Sector Fixed Income Portfolios	0.0% - 3.0%
Inflation Protected (TIPS) Portfolios	
Internally Managed U.S. TIPS	0.0% - 20.0%
U.S. and Non-U.S. TIPS	0.0% - 8.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 2.0%

[1] The maximum amount of internally managed synthetic beta replication will be 11% of the total fund (excludes beta synthetically replicated within the actively managed and indexed Separate Account portfolio).

	Target Capital Ranges as a percentage of the Total Fund
Real Asset Portfolios:	
Infrastructure Portfolios	
Externally Managed Enhanced and Full Discretion	0.0% - 2.0%
Internally Managed U.S. Master Limited Partnership Index	0.0% - 5.0%
Internally Managed Infrastructure Index Portfolio	0.0% - 5.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 2.0%
Commodities Portfolios	
Externally Managed Full Discretion and Enhanced Index Commodity	0.0% - 2.0%
Internally Managed Enhanced Commodities Index Portfolio	0.0% - 7.0%
Internally Managed Gold Index Portfolio	0.0% - 5.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 2.0%
PTRES Portfolios	
Externally Managed U.S., Non-U.S., and Global PTRES	0.0% - 1.0%
Internally Managed PTRES Index Portfolio	0.0% - 5.0%
Internally Managed Synthetic Beta Replication[1]	0.0% - 2.0%
Risk Parity Portfolios:	
Externally Managed Risk Parity Portfolios	0.0% - 4.0%
Internally Managed Risk Parity Portfolio	0.0% - 15.0%
Absolute Return Portfolios:	0.0% - 2.0%
Short Duration Fixed Income Portfolios:	
Internally Managed LIBOR-Plus Short-Term Investment Pool	0.0% - 10.0%
Externally Managed LIBOR-Plus Short-Term Investment Pool	0.0% - 5.0%
Externally Managed Short Duration Non-Agency RMBS Portfolios	0.0% - 2.0%
Internally Managed Short-Term Investment Pool	No limit
Foreign Currency Hedge Overlay:	Up to 100% of the Foreign Currency Exposure[2]
Public Markets In-House Co-Investment Program	$100 million

- $15 million limit for each initial investment
- $10 million limit for follow-on investments

Internally Managed Synthetic Beta Replication represents market exposures in the various asset classes achieved through Derivative exposures such as futures, options, swaps, etc. IOS will synthetically achieve beta exposures to either assist in a transition from one actively managed portfolio to another or to generate alpha. It excludes synthetic beta replication within the actively managed and indexed Separate Account portfolios.

[1] The maximum amount of internally managed synthetic beta replication will be 11% of the total fund (excludes beta synthetically replicated within the actively managed and indexed Separate Account portfolio).
[2] The Total Fund (both public market and private market) foreign currency exposure may be hedged up to 100% back to the U.S. dollar.

Exhibit B – ~~10-Year~~Long-Term Target Allocation

The ~~10-year~~Long-Term Target Allocation shown below represents the long-term strategic allocation that is intended to be achieved over ~~that~~ a period beyond the next year. In addition to maintaining an attractive risk-adjusted return profile, it takes into consideration the liquidity needs of PSERS, particularly relative to the current allocation to illiquid asset classes, which typically cannot be changed prudently in the short term. ~~The Current Target Allocation (Exhibit C) represents the target allocation against which the PSERS portfolio will be managed commencing October 1, 2015. In addition to maintaining an attractive risk-adjusted return profile, the 10-Year Target Allocation takes into consideration the current allocation to illiquid asset classes and recognizes that the allocation to these asset classes cannot be reduced prudently over the short term.~~ The Current Target Allocation (Exhibit C) represents the target allocation against which the PSERS portfolio will be managed commencing October 1, 2016. For the purposes of performance reporting and measurement, the focus ~~will be~~is on the Current Target Allocation. Staff and the Investment Consultant ~~will revisit~~reexamine the Current Target Allocation on an annual basis and ~~provide~~ present to the Board ~~with~~ recommended changes, as needed, based on changing liquidity circumstances and opportunities in the marketplace.

	~~10-Year~~Long-Term Target Allocation	Policy Range Low	Policy Range High
Equity Exposure			
Publicly-traded Global Equity	~~22.50~~20.00%		
Private Markets	15.00%		
Total Equity Exposure	~~37.50~~35.00%	~~27.50~~25.00%	~~47.50~~45.00%
Fixed Income Exposure			
Investment Grade	~~8.50~~11.00%		
Credit-Related	~~8.00~~10.00%		
Inflation Protected	~~12.00~~15.00%		
Total Fixed Income Exposure	~~28.50~~36.00%	~~18.50~~26.00%	~~38.50~~46.00%
Real Asset Exposure			
~~Master Limited Partnerships~~Infrastructure	~~4.00~~8.00%		
~~Infrastructure~~	~~1.00%~~		
Commodities	8.00%		
Real Estate	~~12.00~~10.00%		
Total Real Asset Exposure	~~25.00~~26.00%	~~15.00~~16.00%	~~35.00~~36.00%
Risk Parity	**10.00%**	**5.00%**	**15.00%**
Absolute Return	**10.00%**	~~6.00~~5.00%	~~14.00~~15.00%
Opportunity Allocation[1]	**0.00%**	**0.00%**	**5.00%**
Net Leverage			
Cash	3.00%		
Leverage	~~(14.00%)~~(20.00%)		
Net Leverage	~~(11.00%)~~(17.00%)	~~0.00~~10.00%	~~(22.00%)~~(30.00%)

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TOTAL	**100.00%**

The Policy Ranges for the Target Allocation represent rebalancing triggers and tactical allocation constraints around the target allocations.

For purposes of this analysis, cash and cash equivalents held in each Investment Manager's portfolio will be considered fully invested based on that advisor's objectives (i.e. cash in an equity Investment Manager's account will be considered as part of the Publicly-traded Global Equity in the table above). For classification purposes, cash equivalents include fixed income securities maturing in less than one year.

[1]The Opportunity Allocation is reserved for attractive or innovative strategies that may not fit into the Current or ~~10-Year~~Long-Term Target Allocation but offer a compelling return enhancement and/or diversification benefit (risk reduction). Funding for these investments may come from any other part of the asset allocation, including leverage.

Exhibit C – Current Target Allocation

The current long-term, top-down Target Allocation of the Board, based on the market value of the System's assets as of October 1, 201~~5~~6, subject to the provisions discussed below:

	Cash Markets	Leverage	Current Target Allocation	Policy Range Low	Policy Range High
Equity Exposure					
Publicly-traded Global Equity	~~22.50~~19.00%		~~22.50~~19.00%		
Private Markets	~~15.00~~16.00%		~~15.00~~16.00%		
Total Equity Exposure	~~37.50~~35.00%	0.00%	~~37.50~~35.00%	~~27.50~~25.00%	~~47.50~~45.00%
Fixed Income Exposure					
Investment Grade	6.00%	~~2.50~~3.00%	~~8.50~~9.00%		
Credit-Related	~~8.00~~9.00%		~~8.00~~9.00%		
Inflation Protected	~~6.00~~7.00%	~~6.00~~8.00%	~~12.00~~15.00%		
Total Fixed Income Exposure	~~20.00~~22.50%	~~8.50~~10.50%	~~28.50~~33.00%	~~18.50~~23.00%	~~38.50~~43.00%
Real Asset Exposure					
~~Master Limited Partnerships~~Infrastructure	~~4.00%~~5.50%	0.50%	~~4.00~~6.00%		
~~Infrastructure~~	~~1.00%~~		~~1.00%~~		
Commodities	4.00%	4.00%	8.00%		
Real Estate	~~12.00~~11.50-%	0.50%	12.00%		
Total Real Asset Exposure	~~21.00~~21.00%	~~4.00~~5.00%	~~25.00~~26.00%	~~15.00~~16.00%	~~35.00~~36.00%
Risk Parity	~~8.50~~9.00%	~~1.50~~1.00%	10.00%	5.00%	15.00%
Absolute Return	10.00%		10.00%	~~6.00~~5.00%	~~14.00~~15.00%
Opportunity Allocation[1]	0.00%		0.00%	0.00%	5.00%
Net Leverage					
Cash	3.00%		3.00%		
Financing Cost of Leverage		~~(14.00%)~~(17.00%)	~~(14.00%)~~(17.00%)		
Net Leverage	3.00%	~~(14.00%)~~(17.00%)	~~(11.00%)~~(14.00%)	~~0.00~~10.00%	~~(22.00%)~~(28.00%)
TOTAL	100.00%	0.00%	100.00%		

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Cash markets represent investments which are fully-funded by cash. Leverage represents economic exposures obtained generally through derivative exposure, other forms of financing, or leveraged funds. For example, exposure to Gold can be obtained with very little cash through the swap market.

The portfolio will be managed against the Current Target Allocation shown in the table above. The use of leverage within asset classes as shown reflects how leverage is currently deployed within the PSERS portfolio. It is not intended to be a target leverage allocation. Staff continually monitors the marketplace for opportunities to improve portfolio efficiency. Leverage may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the Policy Range and maximum net leverage permissible under this Policy.

The Policy Ranges for the Asset Allocation represent rebalancing triggers and tactical allocation constraints around the target allocations.

For purposes of this analysis, cash and cash equivalents held in each Investment Manager's portfolio will be considered fully invested based on that advisor's objectives (i.e. cash in an equity Investment Manager's account will be considered as part of the Publicly-traded Global Equity in the table above). For classification purposes, cash equivalents include fixed income securities maturing in less than one year.

[1]The Opportunity Allocation is reserved for attractive or innovative strategies that may not fit into the Current or ~~10-Year~~Long-Term Target Allocation but offer a compelling return enhancement and/or diversification benefit (risk reduction). Funding for these investments may come from any other part of the asset allocation, including leverage.

Exhibit D – Policy Index

The Board adopts the following weighted policy benchmarks to measure the performance of the System beginning ~~April~~ October 1, 2016, subject to footnotes 1 & 4:

	Policy Weight	
Equity Exposure		
Publicly-traded Global Equity		
MSCI USA IMI Gross Index	~~8.80~~7.40%[1]	
MSCI ACWI Ex USA IMI with Developed Market Currencies (75% Hedged to USD) Index Net	~~13.20~~11.10%	
MSCI Emerging Markets Index Net	0.50%	
Private Markets		
Burgiss Median, one-quarter lagged[2]	~~15.00~~16.00%[1]	
Total Equity Exposure		~~37.50~~35.00 %
Fixed Income Exposure		
Investment Grade		
Barclays Capital U.S. Aggregate Index	5.00%	
Barclays Capital Global Aggregated GDP-weighted Developed Market ex-U.S. (Hedged to USD) Index	1.00%	
Barclays Capital U.S. Aggregate Long Treasury Index	~~2.50~~3.00%	
Credit-Related		
Barclays Capital EM Local Currency – Government - MV Weighted (Unhedged) - 10% Country Cap Index	~~2.00~~1.00%	
Barclays Capital U.S. High Yield Index	~~6.00~~8.00%	
Inflation Protected		
Barclays Capital World Government Inflation-Linked Bond Index (Hedged to USD)	~~12.00~~15.00%	
Total Fixed Income Exposure		~~28.50~~33.00 %
Real Asset Exposure		
~~Master Limited Partnerships~~		
~~S&P MLP Index~~	~~4.00%~~	
Infrastructure		
S&P MLP Index	4.00%	
FTSE Developed Core Infrastructure 50/50 (Hedged to USD) Index Net	~~1.00~~2.00%	
Commodities		
Bloomberg Commodity Index	5.00%	
Bloomberg Commodity Gold Subindex	3.00%	
Real Estate		
Private		
NFI and Burgiss Median, one- quarter lagged[3]	~~12.00~~11.00%[4]	
Publicly-traded		
FTSE EPRA/NAREIT Developed Index (Hedged	~~0.00~~1.00%[4]	

to USD) Net		
Total Real Asset Exposure		~~25.00~~26.00%
Risk Parity		
Custom Benchmark[5]		**10.00%**
Absolute Return		
3-Month LIBOR + 3.50%		**10.00%**
Net Leverage		
Cash		
Merrill Lynch U.S. Treasury Bill 0 - 3 Months	3.00%	
Financing Cost of Leverage[6]		
3-Month LIBOR	(~~14.00~~17.00%)	
Net Leverage		**(~~11.00~~14.00%)**
TOTAL		**100.00%**

[1] As the Private Markets allocation is funded (or distributions received) and/or the allocation increases/decreases due to the total market value of the Fund changing, the Publicly-traded Global Equity policy weight (specifically, the combination of MSCI USA IMI Gross Index and MSCI ACWI Ex USA IMI with Developed Market Currencies hedged to USD Index policy weights) will be proportionately and conversely revised to reflect these changes using a 60-40 split between the ex. USA (60%) and USA (40%) indices. For example, if the allocation to Private Markets increases by 100 basis points due to a change in the market value of the total Fund in the fourth quarter, then starting with the first quarter the policy weight will include this 100 basis points increase in the Private Markets benchmark and the Publicly-traded Global Equity policy weights will also be proportionately reduced by 100 basis points. Adjustments to the Private Markets policy weight will be completed in 50 basis point increments (adjustment will be made to the nearest 0.50%) on a quarterly basis.

[2] The benchmark returns are calculated on a weighted vintage year (VY) basis using median VY returns obtained from Burgiss that accounts for the timing of commitments made by the System.

[3] PSERS weights each of the real estate investment strategies actual net asset values of the System's private real estate investments quarterly to produce a customized, blended benchmark return. The NFI-ODCE (NCREIF Open-end Diversified Core Equity) is used for the core strategy whereas returns for value-added and opportunistic strategies are calculated on a weighted vintage year (VY) basis using median VY returns obtained from Burgiss that accounts for the timing of commitments made by the System. This provides a single blended Real Estate policy benchmark return for the System.

[4] As the Private Real Estate allocation is funded (or distributions received) and/or the allocation increases/decreases due to the total market value of the Fund changing, the Publicly-traded Real Estate policy weight will be proportionately and conversely revised to reflect these changes. For example, if the allocation to Private Real Estate increases by 100 basis points due to a change in the market value of the total Fund in the fourth quarter, then starting with the first quarter the policy weight will include this 100 basis points increase in the Private Real Estate benchmark and the Publicly-traded Real Estate policy weight will also be proportionately reduced by 100 basis points. Adjustments to the Private Real Estate policy weight will be completed in 50 basis point increments (adjustment will be made to the nearest 0.50%) on a quarterly basis.

[5] Custom benchmark is structure as follows: MSCI ACWI ($Net) (50%); Barclays Capital U.S. Treasury Index (75%); Barclays Capital World Inflation Linked Bond Index Hedged (55%); Bloomberg Commodity Index (Total Return) (15%); Bloomberg Gold Subindex (5%); and 3-Month LIBOR (-100%).

[6] Financing Cost of Leverage represents the amount of leverage embedded in the asset allocation. Financing may be deployed across any asset class in the portfolio where it is prudent to do so, based on efficient use of leverage within the constraints of the policy range and maximum net leverage permissible under this Policy.

Exhibit E – Public Market Investment Manager Target Ranges

All allocations to individual Investment Manager portfolios shall be subject to the limits established by the Board through the Current Target Allocation in **Exhibit C**. IOS is permitted to manage the allocation of capital to each Investment Manager portfolio within the target ranges to public market Investment Manager portfolios of the total fund noted below. The CIO shall have discretion on the timing of reducing any Investment Manager portfolio exceeding the maximum ranges approved below. However, the CIO is not permitted to allocate additional capital to those portfolios currently above the target ranges.

	Target Capital Ranges as a Percentage of the Total Fund
Equity Portfolios:	
Public Markets U.S. Equity Portfolios	
Internally Managed S&P 500 Index	0.0% - 20.0%
Internally Managed S&P 400 Index	0.0% - ~~2.5~~5.0%
Internally Managed S&P 600 Index	0.0% - ~~2.5~~5.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 5.0%
Public Markets Non-U.S. Equity Portfolios	
Internally Managed MSCI ACW Index ex. U.S.	0.0% - 15.0%
Internally Managed MSCI World Small Cap Index ex. U.S.	0.0% - 2.5%
Internally Managed MSCI Emerging Markets Index	0.0% - 2.5%
Non-U.S. Equity	0.0% - 2.5%
Non-U.S. Small Cap Equity	0.0% - 1.0%
Emerging Markets Equity	0.0% - 1.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 5.0%
Fixed Income Portfolios:	
Investment Grade Portfolios	
Internally Managed U.S. Core Fixed Income	0.0% - 5.0%
U.S. Core Plus or Non-U.S. Developed Fixed Income	0.0% - 3.0%
Internally Managed U.S. Long ~~Treasuries[3]~~Treasuries	0.0% - ~~1.0~~3.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 5.0%
Credit-Related Portfolios	
Emerging Market Fixed Income	0.0% - 1.5%
U.S. High Yield Fixed Income	0.0% - 2.0%
Specialty Finance Debt Strategy	0.0% - 1.0%
Multi-Sector Fixed Income Portfolios	0.0% - 3.0%
Inflation Protected (TIPS) Portfolios~~[1]~~	
Internally Managed U.S. TIPS	0.0% - ~~8.0~~20.0%
U.S. and Non-U.S. TIPS	0.0% - ~~6.0~~8.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 2.0%

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~~[1] The total TIPS portfolios may be leveraged up to 3.3 times in aggregate.~~

~~[2]~~[1] The maximum amount of internally managed synthetic beta replication will be 11% of the total fund (excludes beta synthetically replicated within the actively managed and indexed Separate Account portfolio).

~~[3] The U.S. Long Treasury Portfolio will be notionally funded subject to a maximum notional value of 6% of the total market value of the fund. The capital allocated to this portfolio will be for margin requirements and to settle margin variation.~~

	Target Capital Ranges as a percentage of the Total Fund
Real Asset Portfolios:	
~~Master Limited Partnership Portfolios~~	
~~Externally Managed Enhanced and Full Discretion~~	~~0.0% - 2.0%~~
~~Internally Managed U.S. Master Limited Partnership Index~~	~~0.0% - 4.0%~~
~~Internally Managed Synthetic Beta Replication[2]~~	~~0.0% - 2.0%~~
Infrastructure Portfolios	
Externally Managed Enhanced and Full Discretion	0.0% - 2.0%
Internally Managed U.S. Master Limited Partnership Index	0.0% - ~~4.0~~5.0%
Internally Managed Infrastructure Index Portfolio	0.0% - ~~2.0~~5.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 2.0%
Commodities Portfolios	
Externally Managed Full Discretion and Enhanced Index Commodity	0.0% - 2.0%
Internally Managed Enhanced Commodities Index Portfolio	0.0% - 7.0%
Internally Managed Gold Index Portfolio	0.0% - 5.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 2.0%
PTRES Portfolios	
Externally Managed U.S., Non-U.S., and Global PTRES	0.0% - 1.0%
Internally Managed PTRES Index Portfolio	0.0% - 5.0%
Internally Managed Synthetic Beta ~~Replication[2]~~Replication[1]	0.0% - 2.0%
Risk Parity Portfolios:	
Externally Managed Risk Parity Portfolios	0.0% - 4.0%
Internally Managed Risk Parity Portfolio	0.0% - ~~5.0~~15.0%
Absolute Return Portfolios:	0.0% - 2.0%
Short Duration Fixed Income Portfolios:	
Internally Managed LIBOR-Plus Short-Term Investment Pool	0.0% - ~~8.0~~10.0%
Externally Managed LIBOR-Plus Short-Term Investment Pool	0.0% - 5.0%
Externally Managed Short Duration Non-Agency RMBS Portfolios	0.0% - ~~1.0~~2.0%
Internally Managed Short-Term Investment Pool	No limit
Foreign Currency Hedge Overlay:	Up to 100% of the Foreign Currency ~~Exposure[4]~~Exposure[2]
Public Markets In-House Co-Investment Program	$100 million

- $15 million limit for each initial investment
- $10 million limit for follow-on investments

Internally Managed Synthetic Beta Replication represents market exposures in the various asset classes achieved through Derivative exposures such as futures, options, swaps, etc. IOS will synthetically achieve beta exposures to either assist in a transition from one actively managed portfolio to another or to generate alpha. It excludes synthetic beta replication within the actively managed and indexed Separate Account portfolios.

~~2~~1 The maximum amount of internally managed synthetic beta replication will be 11% of the total fund (excludes beta synthetically replicated within the actively managed and indexed Separate Account portfolio).

[4,2] The Total Fund (both public market and private market) foreign currency exposure may be hedged up to 100% back to the U.S. dollar.

Exhibit F – Private Market and Real Estate Discretionary Structure Capital Limits

All allocations to individual Private Market and Real Estate Discretionary Structure (i.e. Separate Account, Open-end Fund, Co-Investment and Secondary Investment) strategies shall be subject to the limits established by the Board through the Current Target Allocation in **Exhibit C**. IOS is permitted to manage the allocation of capital to each Private Market and Real Estate strategy up to the capital limits noted below. The CIO shall have discretion on the timing of reducing any strategy exceeding the limits approved below. However, the CIO is not permitted to allocate additional capital to those strategies currently above the limits.

	Capital Limits
Private Markets:	
Private Markets In-House Co-Investment and Secondary Investments	$450 million
• $15 million limit for each initial investment	
• $25 million limit for each secondary investment	
• $10 million limit for follow-on investments	
Private Debt In-House Co-Investment and Secondary Investments	$100 million
• $15 million limit for each initial investment	
• $25 million limit for each secondary investment	
• $10 million limit for follow-on investments	
Real Estate:	
Open-end Real Estate Fund Investments	$500 million
• $200 million limit per open-end Real Estate Fund	
Farmland Investments	$100 million
Real Estate In-House Co-Investment and Secondary Investments	$300 million
• $15 million limit for each initial investment	
• $25 million limit for each secondary investment	
• $10 million limit for follow-on investments	
Other:	
Private Markets and Real Estate Pennsylvania In-House Co-Investments	$250 million
• $25 million limit for each initial investment	
• $10 million limit for follow-on investments	