

*Prepared for:*

# ***The Defined Contribution and Retirement Study Committee - I***

***Informational Presentation on the  
Arizona State Retirement System  
"Actuarial Valuation as of June 30, 2012"***

**Arizona State Retirement System  
\*Estimates Utilized**

**November 27, 2012**

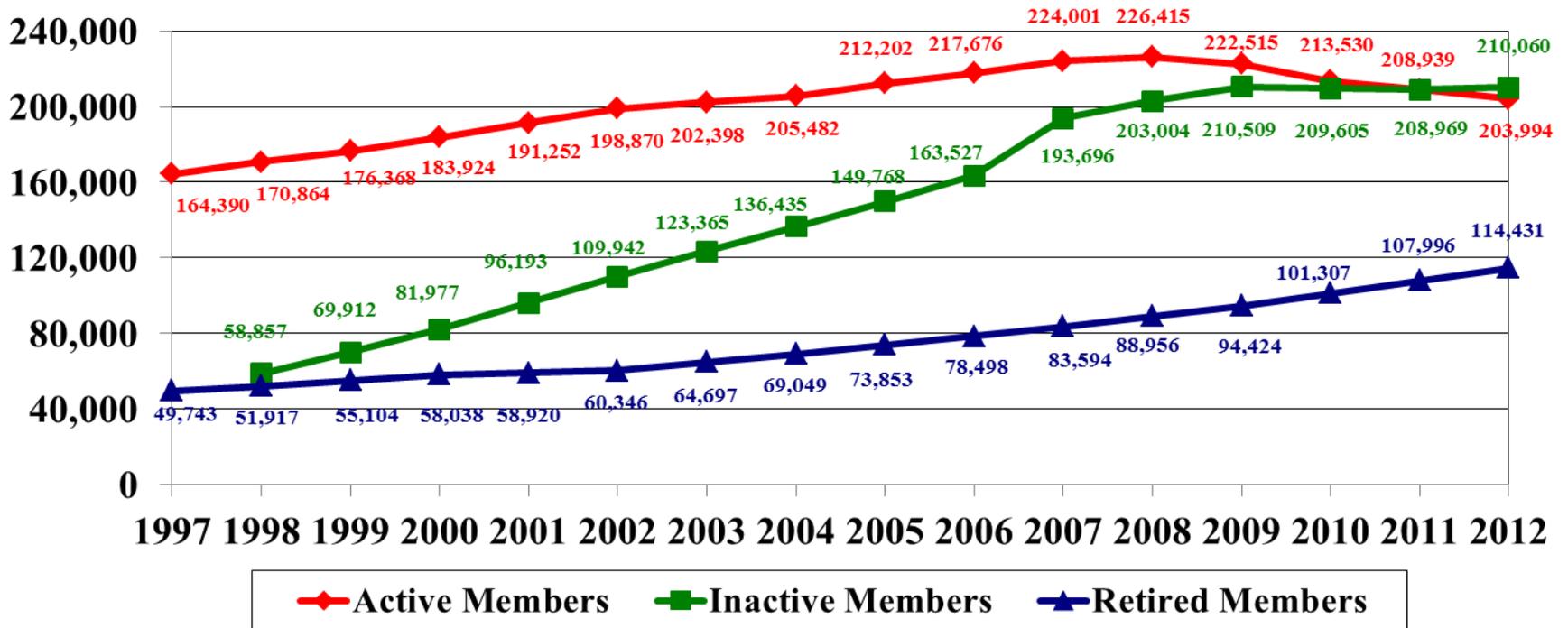


# ASRS ACTUARIAL METHODS AND ASSUMPTIONS

1. **Investment yield**: 8% per annum net of all expenses.
2. **Salary increases**: 4.0% - 9.0% based on years of service.
3. **Mortality rates**: 1994 GAM Static, Projected to
4. **Amortization period**: Rolling 30-year (per statute).
5. **Actuarial value of assets**: 10-year smoothing period.
6. **Projected Unit Credit (PUC)**: (per statute).
7. **Level Dollar Amortization**



# ACTIVE MEMBERS AND RETIRED MEMBERS



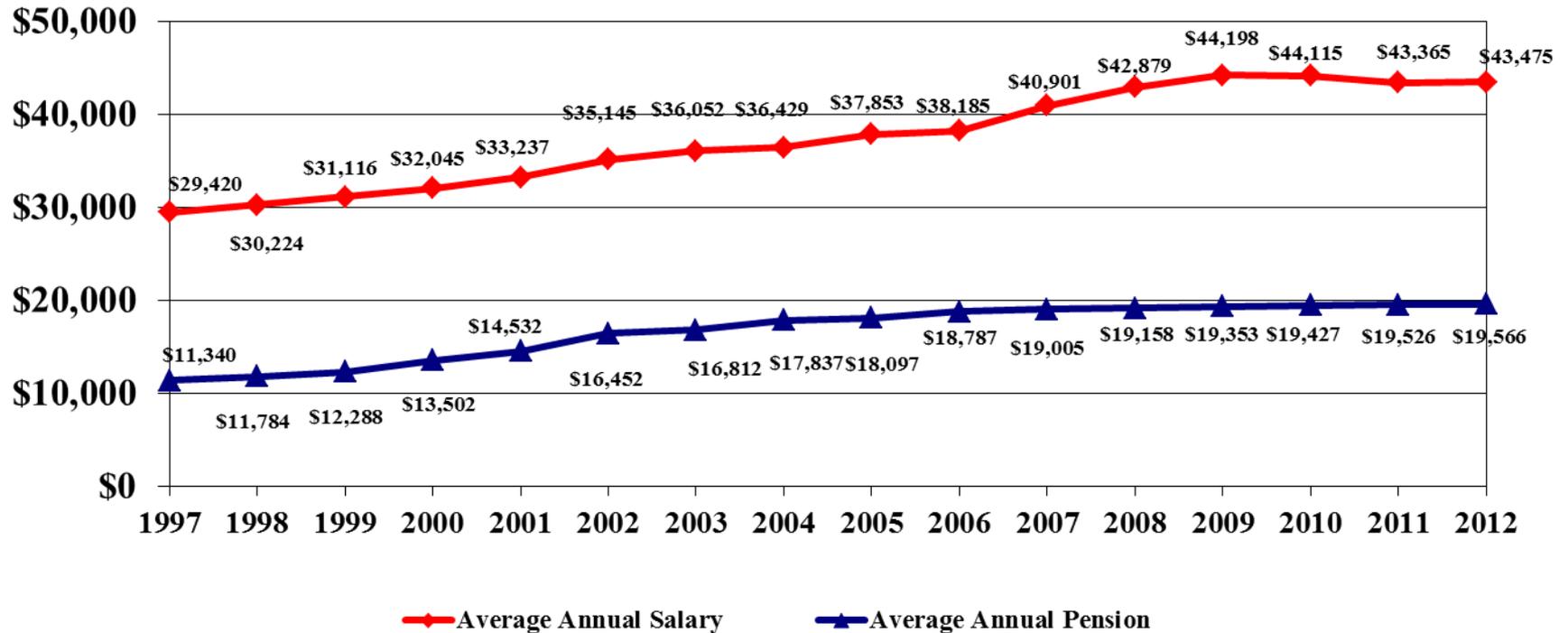
◆ Active Members   
 ■ Inactive Members   
 ▲ Retired Members

1.4% average increase in number of active members since 1997, (2.4%) since 2011  
 9.5% average increase in number of inactive members since 1998, 0.5% since 2011  
 5.7% average increase in number of retired members since 1997, 6.0% since 2011

Excludes an older retirement system that closed in 1976



# AVERAGE SALARY AND AVERAGE BENEFIT

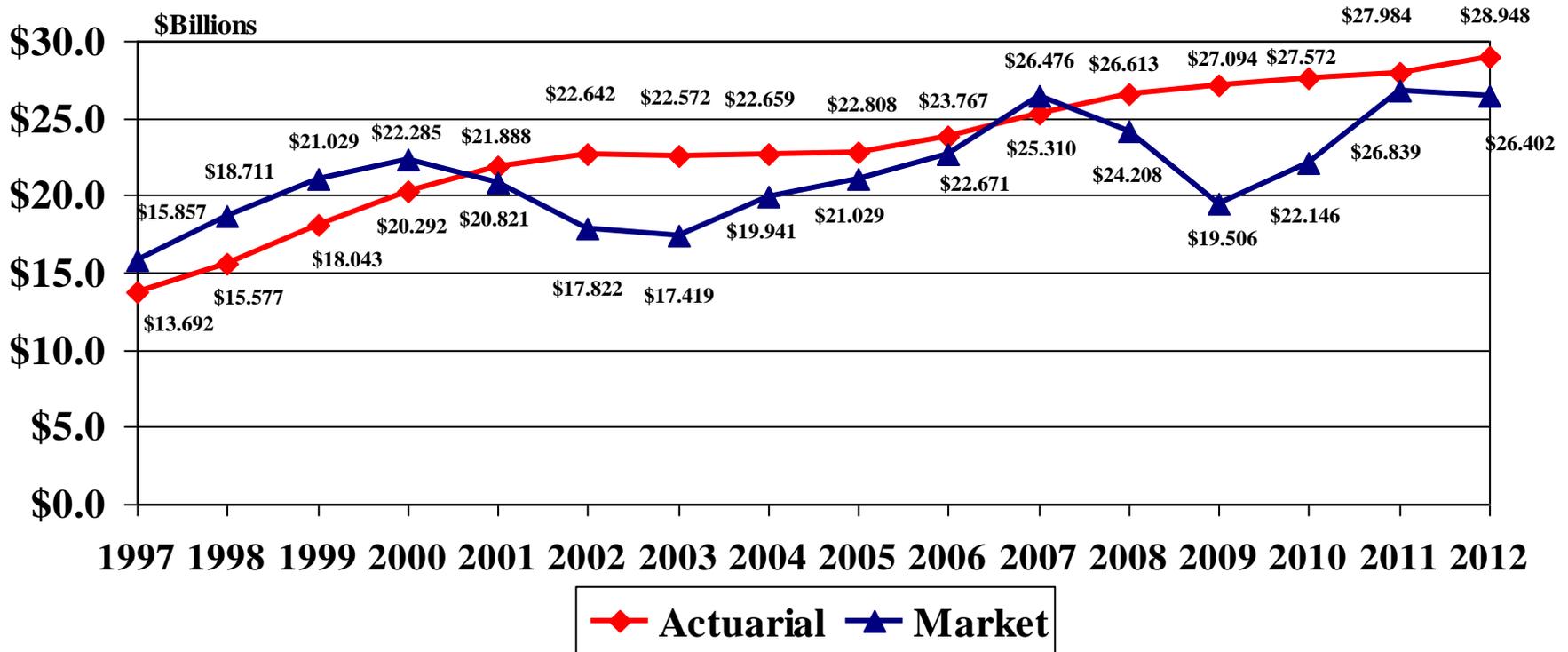


2.6% average increase in average annual salary since 1997, 0.3% between 2011 and 2012  
 3.7% average increase in average annual pension benefit since 1997, 0.2% between 2011 and 2012

Excludes an older retirement system that closed in 1976



# MARKET AND ACTUARIAL VALUES OF ASSETS [401(a) only]



3.5% average increase in market value since 1997

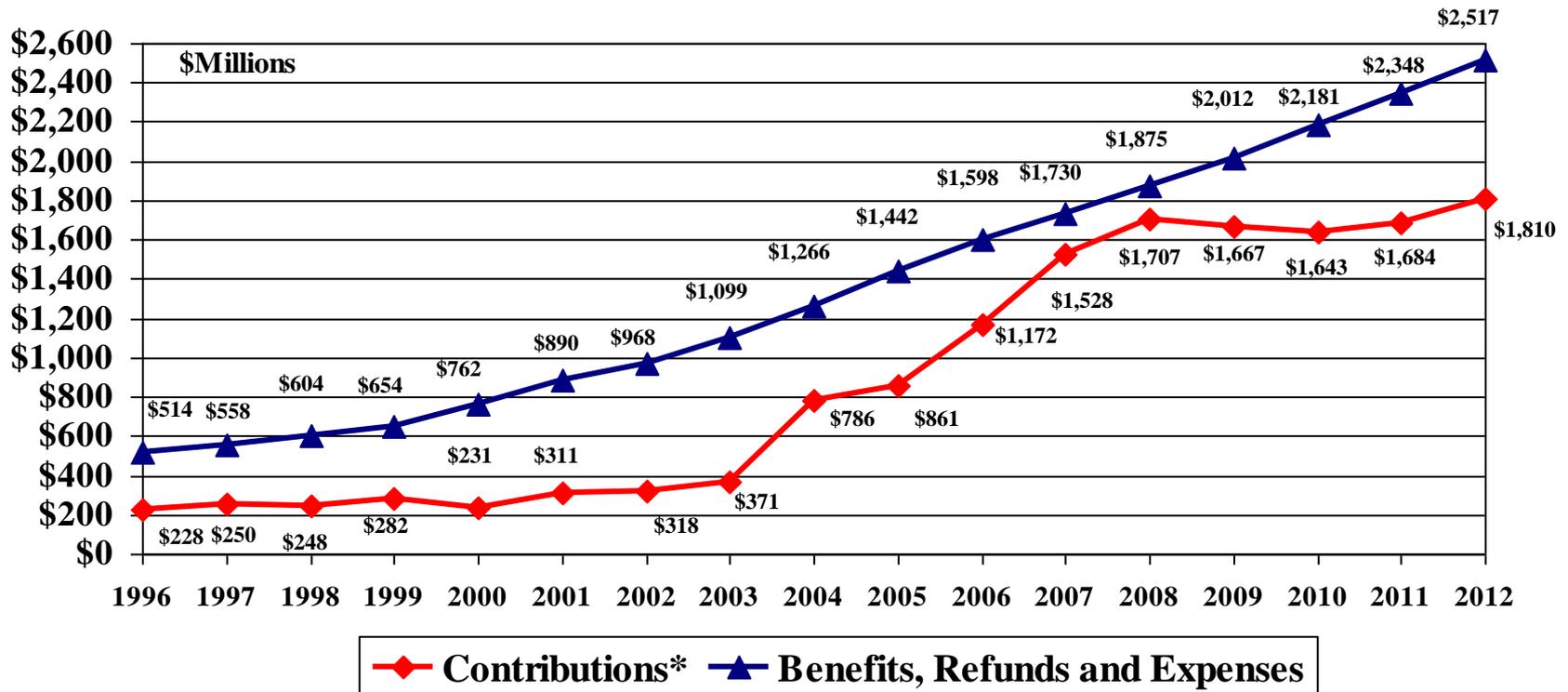
5.1% average increase in actuarial value since 1997

Actuarial assets are 109.6% of market. Actuarial assets exceed market assets by \$2.5 billion.

Includes an older retirement system that closed in 1976 for 2010 - 2012



# CONTRIBUTIONS VS. BENEFITS, REFUNDS, AND EXPENSES [401(a) only]

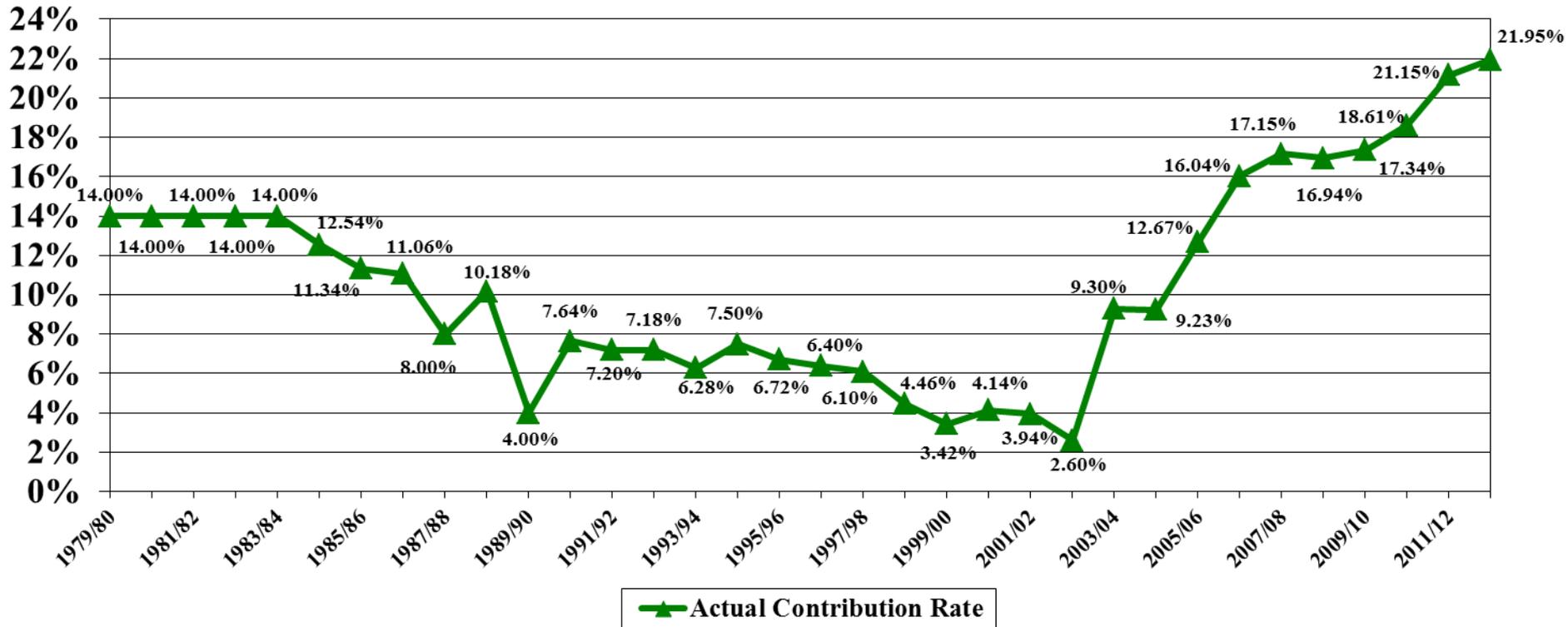


\* Includes member contributions, employer contributions and service purchase contributions

Excludes an older retirement system that closed in 1976



# CONTRIBUTION RATE FOR THE PLAN YEAR [401(a) only -- Total]



Prior to 1997, Pension and Health Insurance contribution rates are combined.

Includes an older retirement system that closed in 1976 for 2010 – 2012



# FUNDED STATUS SUMMARY

	2011		2012	
	Market Value	Actuarial Value	Market Value	Actuarial Value
<b>Asset Amounts</b>				
Pension 401(a)	\$ 26,838,580,309	\$ 27,983,517,225	\$ 26,401,667,918	\$ 28,948,010,913
Health 401(h)	<u>1,194,727,820</u>	<u>1,247,433,042</u>	<u>1,167,345,698</u>	<u>1,281,566,359</u>
Total Plan	\$ 28,033,308,129	\$ 29,230,960,267	\$ 27,569,013,616	\$ 30,229,577,272
<b>Liabilities</b>				
Pension 401(a)	\$ 37,051,179,339	\$ 37,051,179,339	\$ 38,450,288,740	\$ 38,450,288,740
Health 401(h)	<u>1,504,189,674</u>	<u>1,504,189,674</u>	<u>1,502,082,451</u>	<u>1,502,082,451</u>
Total Plan	\$ 38,555,369,013	\$ 38,555,369,013	\$ 39,952,371,191	\$ 39,952,371,191
<b>Funded Status</b>				
Pension 401(a)	72.4%	75.5%	68.7%	75.3%
Health 401(h)	79.4%	82.9%	77.7%	85.3%
Total Plan	72.7%	75.8%	69.0%	75.7%

All numbers include a prior retirement system, referred to as the “System”, that closed in 1976.



# CONTRIBUTION RATE SUMMARY

	June 30, 2011			June 30, 2012		
	401(a)	401(h)	Total	401(a)	401(h)	Total
<b>Total Contribution Rate</b>	<b>21.15%</b>	<b>0.65%</b>	<b>21.80%</b>	<b>22.00%</b>	<b>0.60%</b>	<b>22.60%</b>
Employee Contribution Rate	10.90%	0.00%	10.90%	11.30%	0.00%	11.30%
Employer Contribution Rate	10.25%	0.65%	10.90%	10.70%	0.60%	11.30%
Funded Ratio – AVA	75.5%	82.9%	75.8%	75.3%	85.3%	75.7%
Funded Ratio – MVA	72.4%	79.4%	72.7%	68.7%	77.7%	69.0%



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# APPENDIX - I



# PROJECTED FUNDED STATUS – Actuarial Value of Assets Pension Plan

Assumes future investment returns of 8.0% on Market Value of Assets and excludes future potential PBIs.

Valuation Date	No Growth in Employee Membership	2.5% Annual Growth in Employee Membership
6/30/2012	75%	75%
6/30/2013	75%	75%
6/30/2014	74%	74%
6/30/2015	73%	73%
6/30/2016	73%	73%
6/30/2017	72%	72%
6/30/2018	72%	72%
6/30/2019	73%	74%
6/30/2020	75%	75%
6/30/2021	75%	76%
6/30/2022	76%	77%
6/30/2023	77%	77%
6/30/2024	77%	78%
6/30/2025	78%	79%
6/30/2026	78%	80%

Valuation Date	No Growth in Employee Membership	2.5% Annual Growth in Employee Membership
6/30/2027	79%	80%
6/30/2028	80%	81%
6/30/2029	80%	82%
6/30/2030	81%	82%
6/30/2031	81%	83%
6/30/2032	82%	84%
6/30/2033	82%	84%
6/30/2034	83%	85%
6/30/2035	83%	86%
6/30/2036	84%	86%
6/30/2037	84%	87%
6/30/2038	84%	87%
6/30/2039	85%	88%
6/30/2040	85%	88%
6/30/2041	86%	89%



# PROJECTED FUNDED STATUS – Market Value of Assets Pension Plan

Assumes future investment returns of 8.0% on Market Value of Assets and excludes future potential PBIs.

Valuation Date	No Growth in Employee Membership	2.5% Annual Growth in Employee Membership
6/30/2012	69%	69%
6/30/2013	69%	69%
6/30/2014	70%	70%
6/30/2015	70%	70%
6/30/2016	71%	71%
6/30/2017	72%	72%
6/30/2018	73%	73%
6/30/2019	73%	74%
6/30/2020	74%	75%
6/30/2021	75%	76%
6/30/2022	76%	77%
6/30/2023	77%	77%
6/30/2024	77%	78%
6/30/2025	78%	79%
6/30/2026	78%	80%

Valuation Date	No Growth in Employee Membership	2.5% Annual Growth in Employee Membership
6/30/2027	79%	80%
6/30/2028	80%	81%
6/30/2029	80%	82%
6/30/2030	81%	82%
6/30/2031	81%	83%
6/30/2032	82%	84%
6/30/2033	82%	84%
6/30/2034	83%	85%
6/30/2035	83%	86%
6/30/2036	84%	86%
6/30/2037	84%	87%
6/30/2038	84%	87%
6/30/2039	85%	88%
6/30/2040	85%	88%
6/30/2041	86%	89%



# AGGREGATE PROJECTED CONTRIBUTION RATES – Pension Plan

Assumes future investment returns of 8.0% on Market Value of Assets and excludes future potential PBIs.

<b>Fiscal Year Beginning July 1</b>	<b>No Growth in Employee Membership</b>	<b>2.5% Annual Growth in Employee Membership</b>
2013	21.95%	21.95%
2014	22.47%	22.28%
2015	23.01%	22.58%
2016	23.36%	22.67%
2017	23.54%	22.57%
2018	23.85%	22.57%
2019	23.73%	22.17%
2020	23.05%	21.30%
2021	22.41%	20.48%
2022	22.09%	19.95%
2023	21.69%	19.38%
2024	21.29%	18.83%
2025	20.89%	18.30%
2026	20.47%	17.78%
2027	20.04%	17.27%

<b>Fiscal Year Beginning July 1</b>	<b>No Growth in Employee Membership</b>	<b>2.5% Annual Growth in Employee Membership</b>
2028	19.66%	16.81%
2029	19.27%	16.38%
2030	18.89%	15.97%
2031	18.48%	15.57%
2032	18.09%	15.19%
2033	17.73%	14.86%
2034	17.38%	14.54%
2035	17.04%	14.24%
2036	16.70%	13.97%
2037	16.39%	13.72%
2038	16.10%	13.50%
2039	15.83%	13.30%
2040	15.59%	13.13%
2041	15.36%	12.97%
2042	15.14%	12.83%



# FUNDED STATUS SUMMARY – 8% and 5% Interest

	2012 – 8% Interest		2012 – 5% Interest	
	Market Value	Actuarial Value	Market Value	Actuarial Value
<b>Asset Amounts</b>				
Pension 401(a)	\$ 26,401,667,918	\$ 28,948,010,913	\$ 26,401,667,918	\$ 28,948,010,913
Health 401(h)	<u>1,167,345,698</u>	<u>1,281,566,359</u>	<u>1,167,345,698</u>	<u>1,281,566,359</u>
Total Plan	\$ 27,569,013,616	\$ 30,229,577,272	\$ 27,569,013,616	\$ 30,229,577,272
<b>Liabilities</b>				
Pension 401(a)	\$ 38,450,288,740	\$ 38,450,288,740	\$ 53,426,772,092	\$ 53,426,772,092
Health 401(h)	<u>1,502,082,451</u>	<u>1,502,082,451</u>	<u>2,134,953,715</u>	<u>2,134,953,715</u>
Total Plan	\$ 39,952,371,191	\$ 39,952,371,191	\$ 55,561,725,807	\$ 55,561,725,807
<b>Funded Status</b>				
Pension 401(a)	68.7%	75.3%	49.4%	54.2%
Health 401(h)	77.7%	85.3%	54.7%	60.0%
Total Plan	69.0%	75.7%	49.6%	54.4%

Note: Actual liabilities payable do not change based upon the method, only the measured value of the liabilities change.

All numbers include a prior retirement system, referred to as the “System”, that closed in 1976.



# CONTRIBUTION RATE SUMMARY – 8% and 5%\* Interest

	June 30, 2012 – 8% Interest Rate			June 30, 2012 – 5% Interest Rate		
	401(a)	401(h)	Total	401(a)	401(h)	Total
<b>Total Contribution Rate</b>	<b>22.00%</b>	<b>0.60%</b>	<b>22.60%</b>	<b>38.00%</b>	<b>1.30%</b>	<b>39.30%</b>
Employee Contribution Rate	11.30%	0.00%	11.30%	19.65%	0.00%	19.65%
Employer Contribution Rate	10.70%	0.60%	11.30%	18.35%	1.30%	19.65%
Funded Ratio – AVA	75.3%	85.3%	75.7%	54.2%	60.0%	54.4%
Funded Ratio – MVA	68.7%	77.7%	69.0%	49.4%	54.7%	49.6%

\*Note: Assuming that the expected rate of return earned by the investment portfolio is constant, the present value of the actual contributions collected *does not change with the 5% assumption*, but rather shorter-term contributions are increased significantly while longer-term contributions are decreased.



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# APPENDIX - II



# Forms of Retirement Plan

## What is a “Defined Benefit” (DB) Retirement Plan?

- A form of retirement plan where retirement benefits can be determined ahead of time and is based upon a known formula. Social Security, Military Pensions and the ASRS are examples of Defined Benefit retirement plans.

## What is a “Defined Contribution” (DC) Retirement Plan?

- A form of retirement plan where the retirement benefits are not known ahead of time and are based upon contributions made, investment returns realized, and expenses paid. 401(k)s and IRAs are examples of Defined Contribution retirement plans.



# DB Plan & DC Plan Comparison

Typical Defined Benefit	Pro/Con	Typical Defined Contribution
+ Guaranteed lifetime benefit	+/- Individualized investment decision making	+ Less complex
+ Predictability of future retirement benefit	+/- All risk held by employee	+ More portable
+ Greater retirement equity		
+ Less expensive per benefit level		



# Why are Large DBs Typically Less Expensive?

## □ DB typically results in lower cost per level of retirement benefit because:

- DB typically has higher rates of return
  - Professional asset allocation
  - Greater time horizon and risk tolerance
  - Greater diversification
  
- DB participants need not plan for outliving assets
  - Therefore less savings required



# Funding Models

## Pre-Funding

- Build up investment portfolio equal to accrued liabilities

## Pay-As-You-Go

- Build up investment portfolio only as a liquidity buffer



# Valuation Methods

## ☐ **Measuring Assets:**

- Minor differences in “marked-to-market” methods
  - Private investments
  - Illiquid public investments
  - International investments
- Significant differences in “smoothing” methods
  - Length of period of smoothing
  - Allowable spread between “smoothed” value and “marked-to-market” value.

## ☐ **Measuring Liabilities:**

- Minor differences in demographic assumptions
- Modest differences in valuation methodologies
- Significant differences in discounting methodologies



# ASRS Investment Asset Allocation

Retirement System

Investment Category	Policy Target	Policy Range
Large Cap	23%	
Mid Cap	5%	
Small Cap	5%	
US Equity	33%	(26 - 38%)
Developed Large Cap	14%	
Developed Small Cap	3%	
Emerging	6%	
Non-US Equity	23%	(16 - 28%)
<b>Private Equity</b>	7%	(5 - 9%)
<b>Opportunistic Equity</b>	0%	(0 - 3%)
<b>Total Equity</b>	<b>63%</b>	<b>(53 - 70%)</b>
Core	13%	
High Yield	5%	
US Fixed Income	18%	(8 - 28%)
Emerging Market Debt	4%	
<b>Opportunistic Debt</b>	0%	(0 - 10%)
<b>Private Debt</b>	3%	
<b>Total Fixed Income</b>	<b>25%</b>	<b>(15 - 35%)</b>
<b>Commodities</b>	4%	(1 - 7%)
<b>Real Estate</b>	8%	(6 - 10%)
<b>Infrastructure</b>	0%	(0 - 3%)
<b>Farmland and Timber</b>	0%	(0 - 3%)
<b>Opportunistic Inflation Linked</b>	0%	(0 - 3%)
<b>Total Inflation Linked Assets</b>	<b>12%</b>	<b>(8 - 16%)</b>
<b>TOTAL</b>	<b>100%</b>	
<b>Global Tactical Asset Allocation (GTAA)</b>	10%	(5 - 15%)

Note: Aggregate Opportunistic asset classes not to exceed 10%

**Green:** Denotes asset classes typically absent from DC investment options.



# Investment Returns

(June 30, 2012)

Annualized Rates of Return					
ASRS Total Fund	1 Year	3 Year	5 Year	10 Year	Inception (7/1/1975)
Net of Investment Fees	1.3%	13.2%	1.8%	6.3%	9.8%
Gross of Investment Fees	1.8%	13.6%	2.1%	6.5%	9.7%



# Reasons for Changes in Funded Status

- Low investment returns during FYs 2001-03 and FYs 2008-09**
  
- Change from EAN to PUC (1989)**
  - Low contribution rates during 1990s+
  
- Benefit improvements prior to 2002**
  
- Certain expensive and ineffective plan design features (most remedied)**
  
- Improving life expectancies of retirees**



# Reference Material

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- ❑ *A Better Bang for the Buck: The Economic Efficiencies of Defined Benefit Pension Plans* , National Institute on Retirement Security, 2008
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- ❑ *The Crisis in Local Government Pensions in the United States*, Novy-Marx, Robert and Rauh, Joshua, 2010