

Delaware State Police Pension Plan

**Actuarial Valuation
as of June 30, 2016**

Produced by Cheiron

March 2017

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March 10, 2017

Board of Pension Trustees
State of Delaware
McArdle Building
860 Silver Lake Boulevard, Suite 1
Dover, Delaware 19904

Dear Members of the Board:

At your request, we have conducted the annual actuarial valuation of the Delaware State Police Pension Plan (Plan) as of June 30, 2016. The results of this valuation are contained in this report. The purpose of the valuation is discussed in the Foreword.

This report contains information on Plan assets and liabilities, as well as analyses combining asset and liability performance and projections. It also discloses State contribution levels and required disclosures under the Governmental Accounting Standards Board (GASB) Statement No. 67.

In completing the valuation and preparing our report, we relied on information, some oral and some written, supplied by staff of the Office of Pensions. This information includes, but is not limited to, the Plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The contribution results of this report are only applicable to the State contribution for Fiscal Year (FY) 2018 and rely on future Plan experience conforming to the underlying assumptions. To the extent that actual Plan experience deviates from the underlying assumptions, the results would vary accordingly.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared for the Delaware State Police Pension Plan for the purposes described herein and for the use by the Plan auditor in completing an audit related to the matters herein. Other users of this valuation report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron

A handwritten signature in blue ink that reads "Fiona E. Liston".

Fiona E. Liston, FSA
Principal Consulting Actuary

A handwritten signature in blue ink that reads "Elizabeth Wiley".

Elizabeth Wiley, FSA, EA
Consulting Actuary

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

FOREWORD

Cheiron has performed the annual actuarial valuation of the Delaware State Police Pension Plan (Plan) as of June 30, 2016. The purpose of this report is to:

- 1) **Measure and disclose**, as of the valuation date, the financial condition of the Plan,
- 2) **Indicate trends** in the financial condition of the Plan,
- 3) **Determine the contribution rate** to be paid by the State for Fiscal Year (FY) 2018, and
- 4) **Provide** accounting statement information.

An actuarial valuation establishes and analyzes plan assets and liabilities on a consistent basis and traces the progress of both from one year to the next. It includes measurement of the plan's investment performance as well as an analysis of liability gains and losses.

Section I presents a summary containing our findings and disclosing important trends experienced by the Plan in recent years.

Section II contains details on various asset measures, together with pertinent performance measurements.

Section III shows similar information on liabilities, measured for actuarial, accounting, and governmental reporting purposes.

Section IV presents the FY 2018 actuarially determined contribution.

Section V includes required disclosures under Governmental Accounting Standards Board (GASB) Statement No. 67 and items recommended by the Government Finance Officers Association (GFOA).

The appendices to this report contain a summary of the Plan's membership at the valuation date, a summary of the major provisions of the Plan, and a summary of the actuarial methods and assumptions used in the valuation.

The actuarial assumptions reflect our understanding of the likely future experience of the Plan, and the assumptions individually and as a whole represent our best estimate for the future experience of the Plan. The results of this report rely on future Plan experience conforming to the underlying assumptions and methods outlined in this report. To the extent that the actual Plan experience deviates from the underlying assumptions and methods, or there are any changes in Plan provisions, the true cost of the Plan would vary from our results.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

General Comments

The actuarially determined contribution (ADC) rate increased from 18.19% for FY 2017 to 21.17% for FY 2018.

During the year ended June 30, 2016, the Plan's assets earned negative 1.5% on a market value basis. However, due to the Plan's asset smoothing method, which recognizes only a portion of investment gains and losses, the return on an actuarial value basis was 5.6%. This return was less than the assumed investment rate of return of 7.2% for last year, resulting in an actuarial loss on investments of \$6.2 million.

The Plan experienced an actuarial loss on Plan liabilities resulting from a particularly large number of retirements from those both in active and terminated vested status this year. This liability loss increased the actuarial liability by \$8.6 million. This type of gain or loss is normal in the course of plan experience, as we cannot predict exactly how people will behave. In addition to the actuarial loss, the Plan's liabilities also increased by \$2.2 million due to changes in assumptions as recommended in an experience study performed in 2016.

This valuation report also contains information to be reported in the June 30, 2016 Comprehensive Annual Financial Report (CAFR) of the Delaware Public Employees' Retirement System (Delaware PERS) under GASB Statement No. 67, as well as additional disclosure information recommended by the Government Finance Officers Association (GFOA). The GASB disclosures are based on the use of updated procedures to roll forward the 2015 actuarial valuation liability results. The calculation of net pension liability in Section V is shown as disclosed for the plan year ending June 30, 2016, based on the 2015 funding actuarial valuation liability results, updated to reflect the assumption changes adopted by the Board of Trustees as recommended in the recent experience study. We also present a projection of the June 30, 2017 disclosure in Section V, assuming all actuarial assumptions are met over the coming year, which is based on the 2016 funding actuarial valuation liability results.

As of the June 30, 2016 funding actuarial valuation, the Plan's unfunded actuarial liability (UAL) was \$41.9 million. This is an increase from the \$25.4 million UAL in the funding valuation for the prior year.

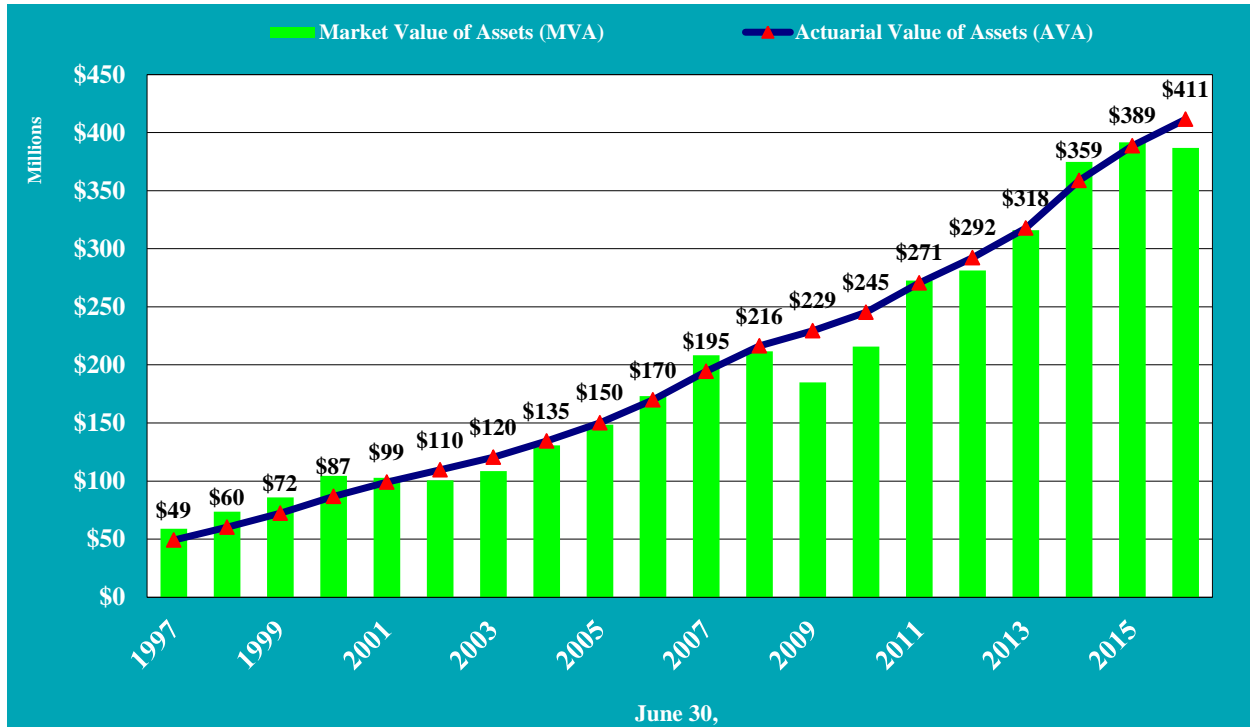
DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016

SECTION I - BOARD SUMMARY

Trends

Growth in Assets

The graph below shows measurements of the Plan’s assets over the last 20 years based on both market values and actuarial values. The green bars represent the market value measurements, while the blue line shows the actuarial value measurements. The black numbers are the actuarial value of asset measurements as of the valuation date for each year in millions of dollars.



The market value of assets (MVA) returned negative 1.5% over the last year. The determination of the Plan’s actuarial value of assets (AVA) for the current year reflects a portion of the return below the 7.2% assumed for the year, and continued recognition of prior years’ gains and losses, and thus returned 5.6% over FY 2016.

Over the period July 1, 1997 to June 30, 2016, the Plan’s assets have had an approximately 8.4% annual geometric return on an actuarial value basis, compared to the current valuation assumption of 7.2%.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

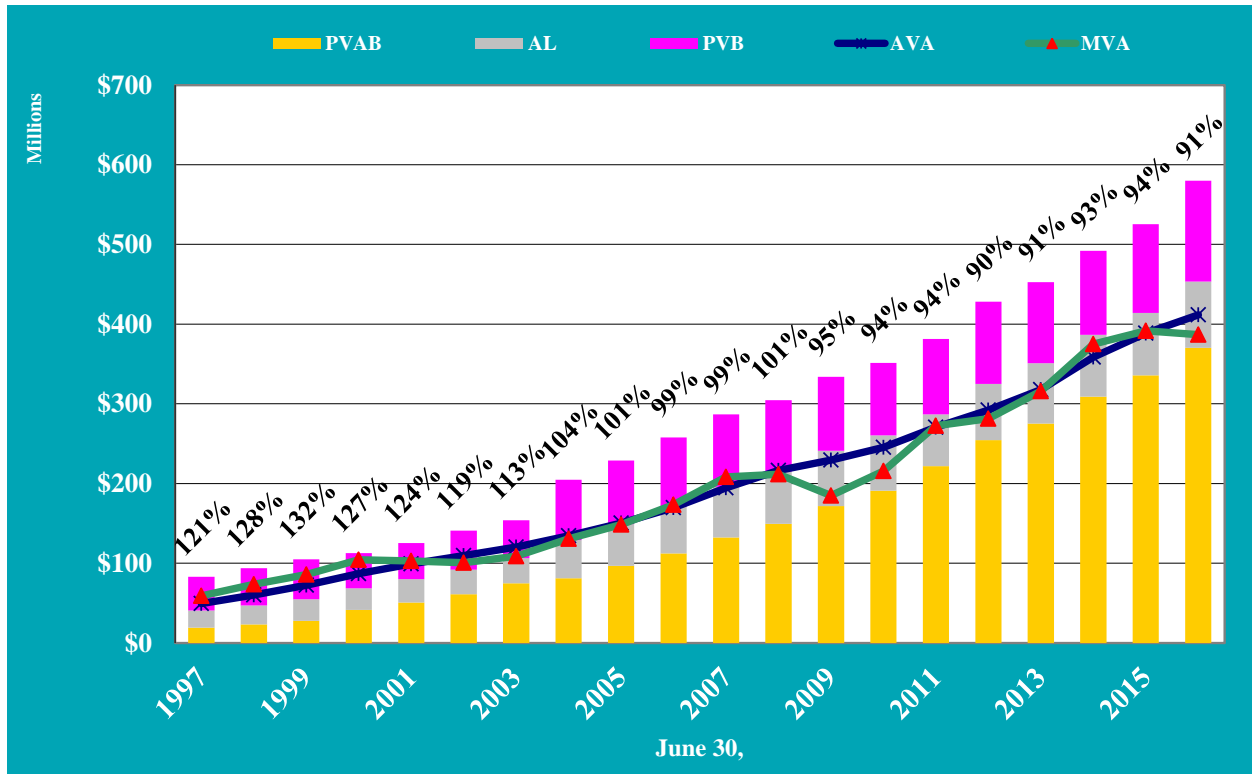
SECTION I - BOARD SUMMARY

Assets and Liabilities

The three colored bars below represent the three different measures of liability discussed in this report. The first measure is given by the yellow bars, the present value of accrued benefits (PVAB). The PVAB values represent the value of all benefits earned by current members through the valuation date. These values do not reflect any future additional service or salary increases for current members beyond the valuation date.

The second liability measure is the one currently used for the Plan's funding target, the actuarial liability (AL). These target amounts are represented by the top of the gray bars. This measurement is also the basis of the liability measure used in GASB 67. The funded ratios reported by the Plan are the percentages shown above the bars and are developed by comparing these target measurements of liability to the actuarial value of assets at each valuation date.

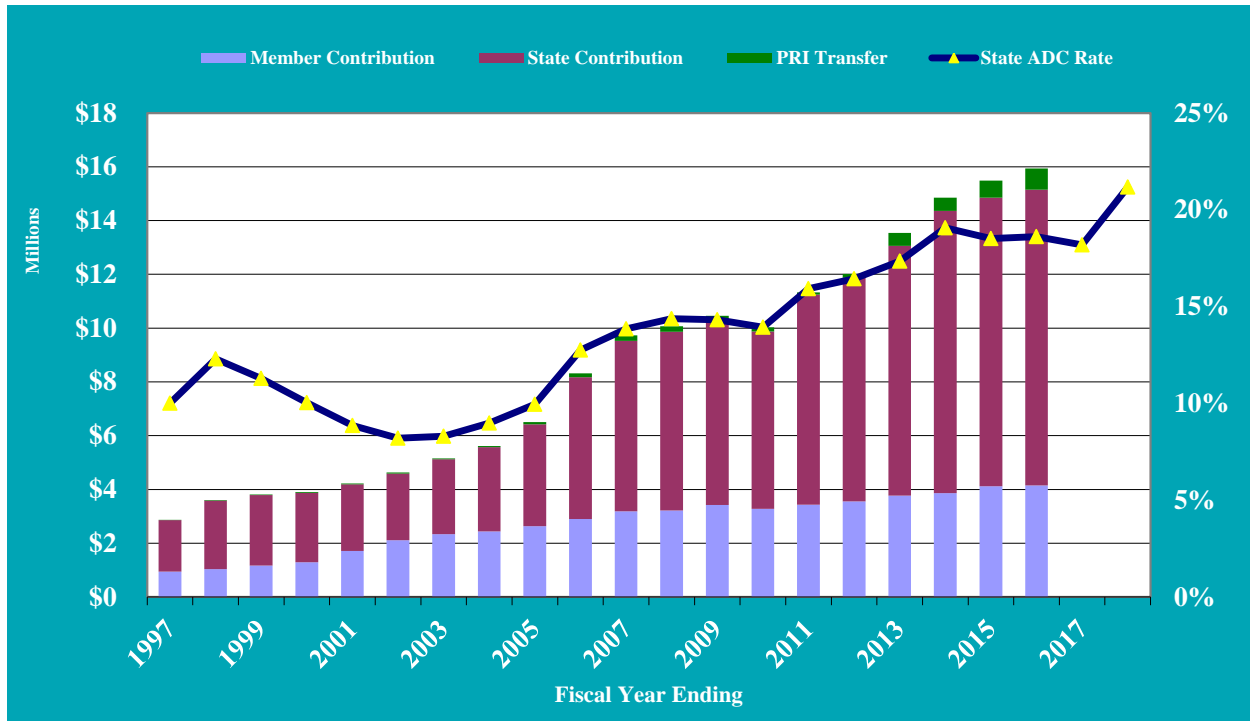
The amount represented by the top of the pink bars, the present value of future benefits (PVB), is the amount needed to provide all benefits for the current members and their beneficiaries, including reflection of assumed future service and pay increases. If the Plan had assets equal to the PVB as of a certain date, no additional contributions would, in theory, be needed to pay the benefits of the current members if all assumptions were exactly met from that point forward.



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

Contribution Rates



The stacked bars in the graph above show the dollar amounts of the contributions made by the State, the Post-Retirement Increase Fund (PRI), and the members for each fiscal year and are read using the left-hand scale. The blue line shows the State ADC rate for each fiscal year as a percentage of payroll (right-hand scale).

The member contribution rate is set by State law, based on the Plan in which the member participates. The State contribution rate is set by the actuarial process, while the PRI transfer amounts depend on the increases granted by the State Legislature. Please note that there is a lag in the State contribution rates shown. For example, the value shown for the FY 2016 is the rate prepared by the June 30, 2014 valuation and implemented for the period July 1, 2015 to June 30, 2016.

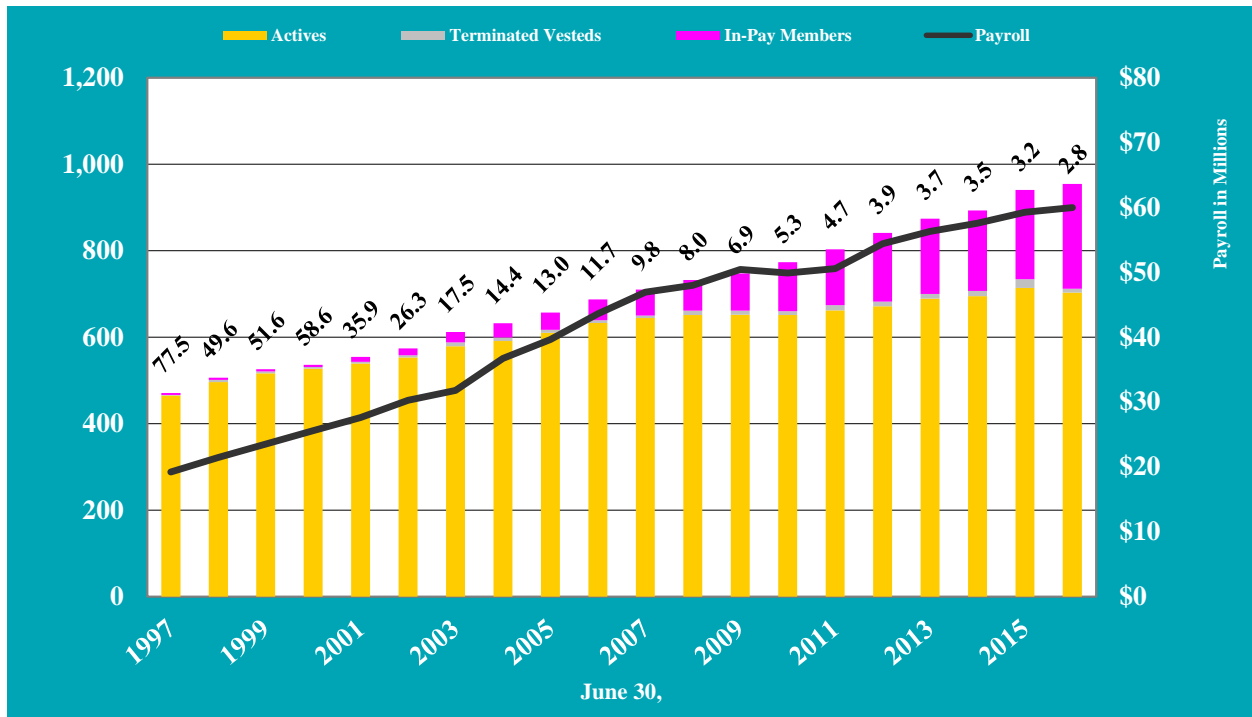
**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

Participant Trends

The bars below show the number of members as of each valuation date, divided between active members, terminated vested members, and retirees/beneficiaries. These bars are read using the left-hand scale. As with most maturing funds, this plan continues to show growth in the number of inactive members. The numbers that appear above each bar represent the ratio of active members to inactive members (retirees, beneficiaries, and terminated vested members) at each valuation date. This active-to-inactive ratio has decreased from 77.5 actives to each inactive in 1997 to 2.8 actives for each inactive in 2016. The rapid decline is simply due to the fact that this was a new plan in the 1990's and did not yet have many retirees.

The black line shows the covered payroll for the Plan as of each valuation date and is read using the right-hand scale.

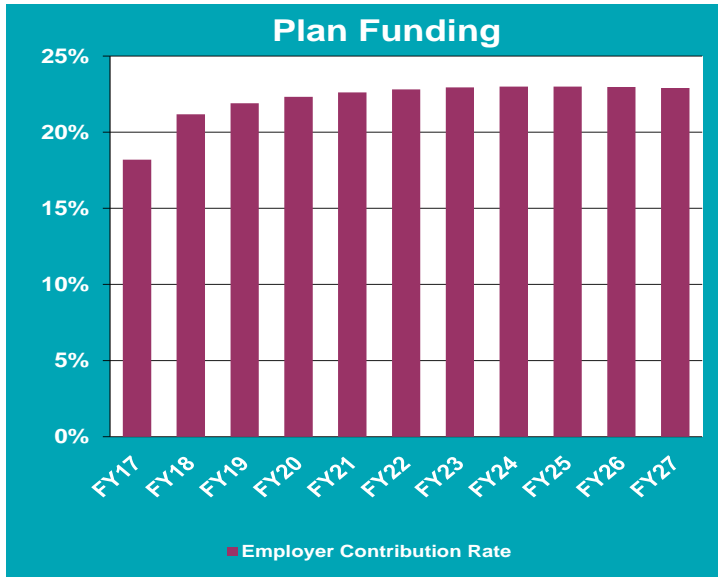


DELAWARE STATE POLICE PENSION PLAN
 ACTUARIAL VALUATION AS OF JUNE 30, 2016

SECTION I - BOARD SUMMARY

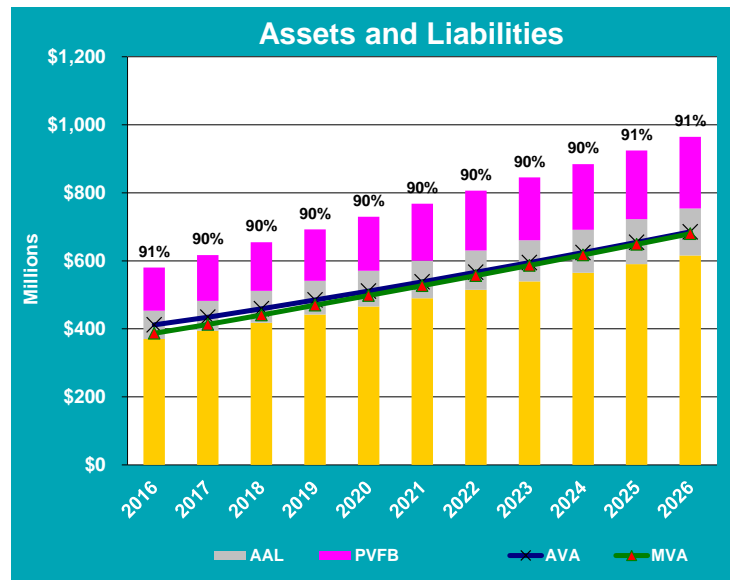
Future Outlook

Baseline Projections



These graphs show the expected progress of the Plan over the next 10 years, assuming the Plan’s assets earn 7.2% on a *market value* basis and assuming all assumptions are exactly met, including that the actuarially determined contribution (ADC) amounts are made in full. The chart entitled “Plan Funding” shows an increase in the State ADC rate from 21.2% in FY 2018, determined by the current valuation, to 22.9% at the end of this period, as existing investment losses are recognized by the asset smoothing method.

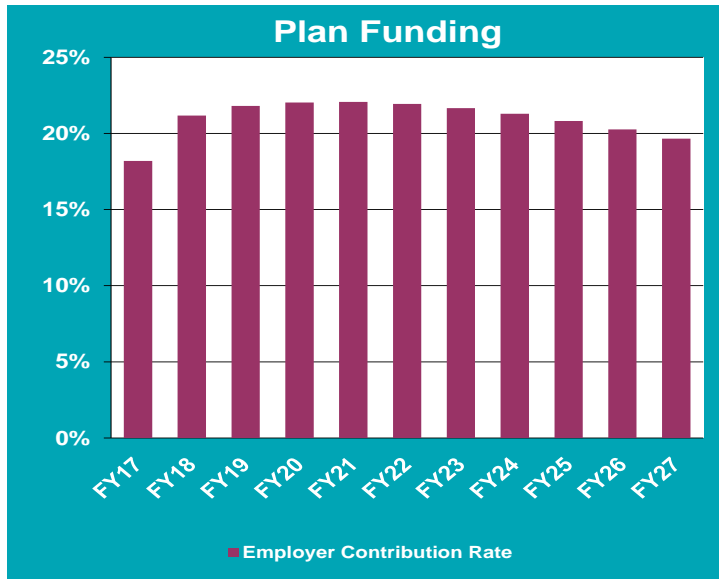
The “Assets and Liabilities” graph shows the projected funded ratios of the Plan over the next 10 years. The Plan’s funded status is projected to remain stable over the 10-year projection period, assuming all assumptions are exactly met.



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

Projections with Asset Returns of 8.2%

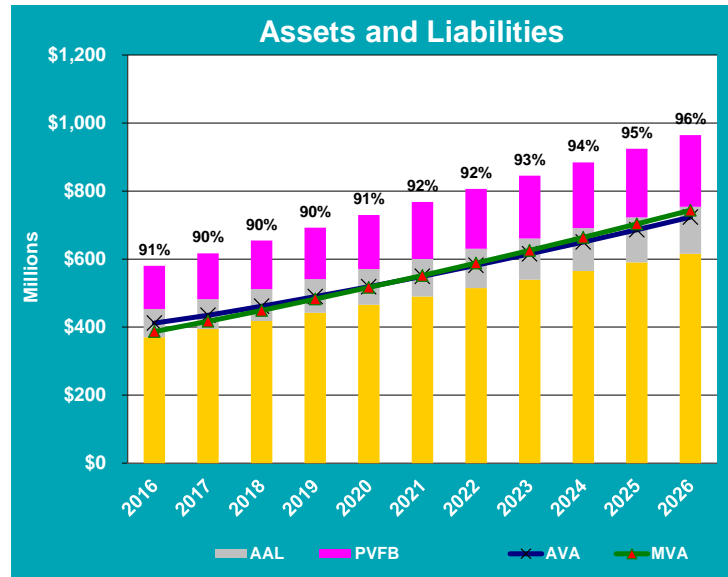


The Plan’s investment earnings will affect the future funding status of the Plan. The two graphs on this page show what the next 10 years would be expected to look like if the Plan’s investment performance is 8.2% each year, 1.0% higher than the valuation investment rate of return assumption.

These two graphs assume all other assumptions are exactly met, including State contributions equal to the full actuarially determined amounts.

The “Plan Funding” graph shows that under this scenario the State ADC rate would continue to increase for a couple of years beyond the FY 2018 rate determined by this valuation, as the stored investment losses are recognized by the asset smoothing method. The rate then stabilizes and begins to decline to 19.7% of payroll at the end of the 10-year projection period.

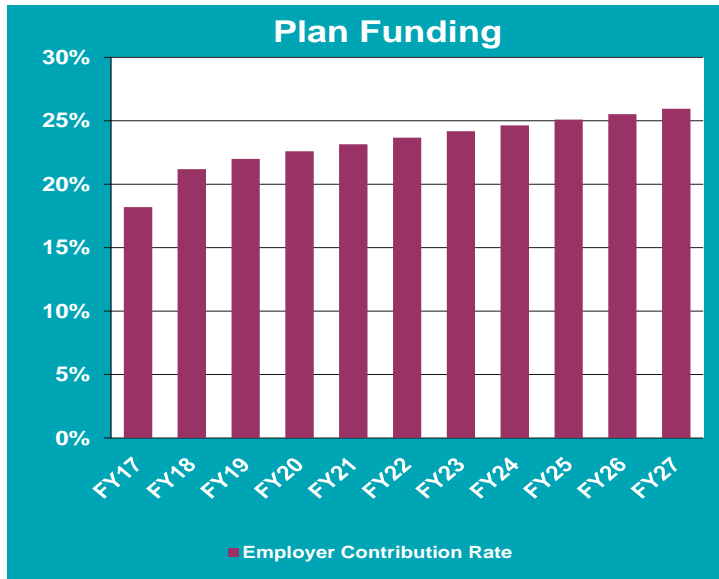
The “Assets and Liabilities” graph shows that under this scenario the Plan would reach a 96% funded ratio by 2026, an improvement over the baseline scenario’s ultimate ratio of 91%.



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

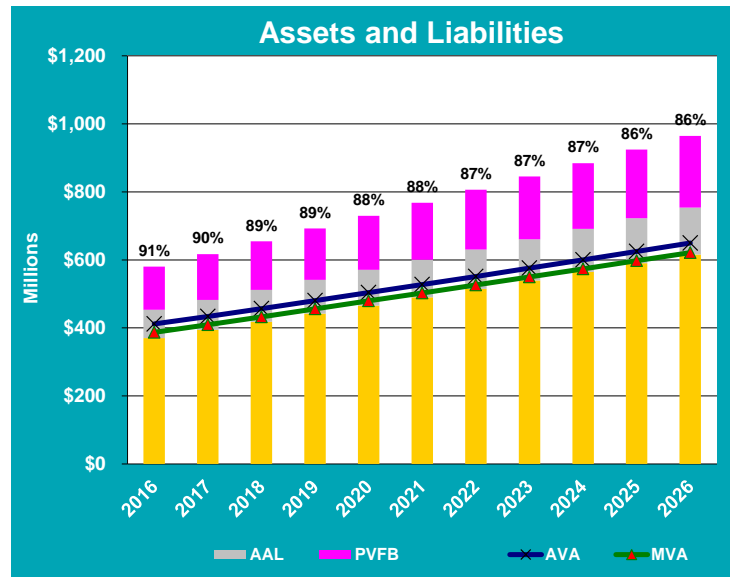
Projections with Asset Returns of 6.2%



The graphs on this page show projections of the Plan’s funding status and contributions assuming that the Plan’s investment performance is 6.2% each year of the projection, 1.0% lower than the valuation investment rate of return assumption.

Note that these projections assume all other assumptions are exactly met, including payment of State contributions equal to the full actuarially determined contribution.

Under this scenario, the State’s ADC rate increases to approximately 26.0% of payroll by the end the 10-year period, compared to the 22.9% ultimate rate in the baseline projection. Additionally, the funded ratio is projected to drop in this scenario, declining to 86% at the end of the 10-year period, which is lower than the 91% ultimate ratio in the baseline projection.



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION I - BOARD SUMMARY

**Table I-1
Summary of Principal Plan Results**

Valuation as of:	June 30, 2015	June 30, 2016	% Change
<u>Member Counts</u>			
Active Members	714	703	(1.54%)
Disabled Members	23	23	0.00%
Retirees and Beneficiaries	183	219	19.67%
Terminated Vested Members	20	9	(55.00%)
Terminated Non-Vested Members	<u>0</u>	<u>3</u>	N/A
Total Member Counts	940	957	1.81%
Covered Payroll of Active Members*	\$ 59,249,700	\$ 59,980,000	1.23%
Annual Benefit Payments for Retirees, Disabled Members, and Beneficiaries	\$ 12,750,600	\$ 15,963,600	25.20%
<u>Assets and Liabilities</u>			
Actuarial Liability (AL)	\$ 414,031,500	\$ 453,393,300	9.51%
Actuarial Value of Assets (AVA)	<u>388,586,600</u>	<u>411,481,400</u>	5.89%
Unfunded AL (UAL)	\$ 25,444,900	\$ 41,911,900	64.72%
Funded Ratio on AVA Basis (AVA/AL)	93.9%	90.8%	
Funded Ratio on MVA Bases (MVA/AL)	94.6%	85.3%	
Present Value of Accrued Benefits (PVAB)	\$ 335,793,200	\$ 370,325,600	10.28%
Market Value of Assets (MVA)	<u>391,719,200</u>	<u>386,803,700</u>	(1.25%)
Unfunded PVAB	\$ (55,926,000)	\$ (16,478,100)	70.54%
Accrued Benefit Funded Ratio (PVAB/MVA)	116.7%	104.4%	
<u>State Contribution Rate</u>			
	Fiscal Year 2017	Fiscal Year 2018	
Entry Age Normal Cost	15.08%	15.79%	
UAL Amortization Payment	2.96%	5.23%	
Administrative Expense	<u>0.15%</u>	<u>0.15%</u>	
Actuarially Determined Contribution (ADC)	18.19%	21.17%	

* Assumes one year of payroll increase projection, so represents payroll beginning on each valuation date.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION II - ASSETS

Pension plan assets play a key role in the financial operation of the Plan and in the decisions that the Board of Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely affect benefit levels, State actuarially determined contributions, and the ultimate security of members' benefits.

In this section, we present detailed information on the Plan's assets including:

- **Disclosure** of the Plan's assets at June 30, 2015 and June 30, 2016,
- Statement of the **changes** in market values during FY 2016,
- Development of the **actuarial value of assets**,
- An assessment of **investment performance**, and
- A projection of the Plan's expected **cash flows** for the next 10 years.

Market Value of Assets Disclosure

The market values of assets represent "snap-shot" or "cash-out" values that provide the principal basis for measuring financial performance from one year to the next. However, market values can fluctuate widely with swings in the marketplace, and as such, are usually not suitable for budgeting and long-range planning.

Table II-1 below shows the market values as of June 30, 2015 and June 30, 2016, along with the changes between the two.

Table II-1	
Changes in Market Values of Assets	
Market Value of Assets – June 30, 2015	\$ 391,719,200
<u>Additions</u>	
Member Contributions	\$ 4,145,800
State Contributions	11,000,800
PRI Transfers	792,900
Other	4,100
Investment Returns	<u>(5,963,700)</u>
Total Additions	\$ 9,979,900
<u>Deductions</u>	
Benefit Payments	\$ 14,804,100
Administrative Expenses	<u>91,300</u>
Total Deductions	\$ 14,895,400
Market Value of Assets – June 30, 2016	\$ 386,803,700

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION II - ASSETS

Actuarial Value of Assets

The actuarial value of assets represents a “smoothed” value developed by the actuary to reduce, or eliminate, erratic results that could develop from short-term fluctuations in the market value of assets. The actuarial value for this plan equals the expected actuarial value of assets, developed from the immediately prior valuation, plus 20% of the difference between the actual market value of assets and that expected actuarial value of assets at the valuation date. The table below illustrates the calculation of the actuarial value of assets as of June 30, 2016.

Table II-2 Development of Actuarial Value of Assets		
1.	Actuarial Value of Assets at June 30, 2015	\$ 388,586,600
2.	Amount in (1) with interest to June 30, 2016 at 7.20% per year	\$ 416,564,800
3.	State, PRI, and member contributions for the Plan Year ended June 30, 2016	15,943,600
4.	Interest on contributions assuming payments made uniformly throughout the year to June 30, 2016 at 7.20% per year	574,000
5.	Disbursements from Trust except investment expenses, July 1, 2015 through June 30, 2016	14,895,400
6.	Interest on disbursements to June 30, 2016 at 7.20% per year	<u>536,200</u>
7.	Expected Actuarial Value of Assets at June 30, 2016 = (2) + (3) + (4) – (5) – (6)	\$ 417,650,800
8.	Actual Market Value of Assets at June 30, 2016	<u>\$ 386,803,700</u>
9.	Excess of (8) over (7)	\$ (30,847,100)
10.	Actuarial Value of Assets at June 30, 2016 = (7) + 20% of (9)	\$ 411,481,400

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION II - ASSETS

Investment Performance

The market value of assets (MVA) returned negative 1.5% during 2016, which is less than the assumed 7.2% investment rate of return. The actuarial value of assets (AVA) returned 5.6% over this same year, reflecting the asset smoothing method being utilized by the Plan for the measurement of the actuarial value of assets. Since only 20% of the gain or loss from the performance of the Plan is typically recognized in a given year under the asset smoothing method, in periods of very good performance, the AVA can lag significantly behind the MVA, and in a period of negative returns, the AVA does not decline as rapidly as the MVA.

Projection of Cash Flows

Table II-3 Cash Flow Projections		
Year Beginning July 1,	Expected Benefit Payments	Expected Contributions*
2016	\$ 17,165,000	\$ 15,700,000
2017	19,235,000	17,524,000
2018	21,412,000	17,964,000
2019	23,838,000	18,196,000
2020	26,091,000	18,650,000
2021	28,112,000	19,117,000
2022	30,128,000	19,595,000
2023	32,280,000	20,084,000
2024	34,548,000	20,587,000
2025	37,070,000	21,101,000

* Expected contributions include State contributions, member contributions, and PRI transfers. For illustration purposes, we have assumed the State contribution rate will remain level and that payroll will increase at the actuarially assumed rate of 2.50% per year.

Expected benefit payments are projected for the closed group valued at June 30, 2016. Projecting any further than 10 years using a closed-group would not yield reliable predictions due to the omission of new hires in the benefit payments, compounded by their inclusion in the expected contributions.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION III - LIABILITIES

In this section, we present detailed information on the Plan's liabilities for funding purposes, including:

- **Disclosure** of the Plan's liabilities at June 30, 2015 and June 30, 2016, and
- Statement of **changes** in these liabilities during the year.

Disclosure

Three liability measurements are calculated and presented in this report. Each type is distinguished by the purpose, or purposes, for which they are used.

- **Present Value of Benefits (PVB):** Used for analyzing the financial outlook of plans, this represents the amount of money needed today to fund all future benefits and expenses of a plan, assuming current members continue to accrue benefits and there are no new entrants, and that all actuarial assumptions are met.
- **Actuarial Liability (AL):** Used for funding calculations for a plan and GASB disclosures, this liability is calculated by taking the present value of benefits (PVB) and subtracting the present value of future member contributions (PVFEEC) and the present value of future State normal costs (PVFNC) under an acceptable actuarial funding method. The Plan uses the **Entry Age Normal** funding method.
- **Present Value of Accrued Benefits (PVAB):** Used for communicating the current level of liabilities, this liability represents the total amount of money needed today to fund the current accrued obligations of a plan, assuming no future accruals of benefits or salary increases. These liabilities are also required for some accounting purposes of some plans (Topic No. 960). This plan is not subject to this requirement, but this information is provided for informational purposes, as it is sometimes used as part of assessing whether a plan can meet its current benefit commitments. It is not, however, intended as a settlement liability value. Note that the development of this amount also assumes that all actuarial assumptions are met, including the assets earning 7.2% per year.

Note that none of the liability amounts disclosed in this report is appropriate for measuring a settlement of the Plan's liabilities.

The following table discloses each of these liabilities for the current and immediately prior funding valuations. With respect to each disclosure, a subtraction of an appropriate value of Plan assets yields, for each respective type, either a net surplus or an unfunded amount.

DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016

SECTION III - LIABILITIES

**Table III-1
Liabilities and Net (Surplus)/Unfunded Amounts**

	June 30, 2015	June 30, 2016
<u>Present Value of Benefits</u>		
Active Member Benefits	\$ 365,353,200	\$ 386,308,500
Retiree, Beneficiary, Disabled, and Terminated Members Benefits	<u>160,156,100</u>	<u>193,683,300</u>
Present Value of Benefits (PVB)	\$ 525,509,300	\$ 579,991,800
Market Value of Assets (MVA)	\$ 391,719,200	\$ 386,803,700
Future Member Contributions	35,329,600	38,866,700
Future State Contributions & PRI Fund Transfers	<u>98,460,500</u>	<u>154,321,400</u>
Total Resources	\$ 525,509,300	\$ 579,991,800
<u>Actuarial Liability</u>		
Present Value of Benefits (PVB)	\$ 525,509,300	\$ 579,991,800
Present Value of Future State Normal Costs (PVFNC)	76,148,200	87,731,800
Present Value of Future Member Contributions (PVFEEC)	<u>35,329,600</u>	<u>38,866,700</u>
Actuarial Liability (AL=PVB-PVFNC-PVFEEC)	\$ 414,031,500	\$ 453,393,300
Actuarial Value of Assets (AVA)	<u>388,586,600</u>	<u>411,481,400</u>
Net (Surplus)/Unfunded AL (AL - AVA)	\$ 25,444,900	\$ 41,911,900
<u>Present Value of Accrued Benefits</u>		
Present Value of Benefits (PVB)	\$ 525,509,300	\$ 579,991,800
Present Value of Future Benefit Accruals (PVFBA)	<u>189,716,100</u>	<u>209,666,200</u>
Present Value of Accrued Benefits (PVAB=PVB-PVFBA)	\$ 335,793,200	\$ 370,325,600
Market Value of Assets (MVA)	\$ 391,719,200	\$ 386,803,700
Net (Surplus)/Unfunded PVAB (PVAB - MVA)	\$ (55,926,000)	\$ (16,478,100)

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION III - LIABILITIES

Changes in Liabilities

Each of the liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New entrants since the last valuation
- Benefits accrued since the last valuation
- Plan amendments increasing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- A change in actuarial assumptions
- A change in actuarial methods

Unfunded liabilities (or surpluses), developed from subtraction of an appropriate value of Plan assets from these liability measures, will change because of all of the above as well as due to changes in Plan asset measures resulting from:

- State contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure Plan assets

In each valuation, we report on those elements of change that are of particular significance, potentially affecting the long-term financial outlook of the Plan. Below we present key changes in liabilities since the last valuation.

Table III-2 Liability Changes			
(In Thousands)	Present Value of Benefits	Actuarial Liability	Present Value of Accrued Benefits
Liabilities June 30, 2015	\$ 525,509	\$ 414,032	\$ 335,793
Liabilities June 30, 2016	579,992	453,393	370,326
Liability Increase/(Decrease)	54,483	39,361	34,533
Change Due to:			
PRI	0	0	0
Actuarial (Gain)/Loss	NC *	8,657	NC *
Benefit Changes	0	0	0
Assumption Changes	14,782	2,199	(136)
Benefits Accumulated and Other Sources	39,701	28,505	34,669

* NC = not calculated

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION III - LIABILITIES

Table III-3 below provides additional information about the liability measurements for funding purposes as of both the current and the immediately prior valuations.

Table III-3 Actuarial Liabilities for Funding		
	June 30, 2015	June 30, 2016
1. Actuarial Liabilities		
Retiree, Beneficiary, Disabled, and Terminated Members	\$ 160,156,100	\$ 193,683,300
Active Members	<u>253,875,400</u>	<u>259,710,000</u>
Total Actuarial Liability	\$ 414,031,500	\$ 453,393,300
2. Actuarial Value of Assets	\$ 388,586,600	\$ 411,481,400
3. Unfunded Actuarial Liability (UAL)	\$ 25,444,900	\$ 41,911,900
4. Present Value of Outstanding PRI Transfers	\$ 1,610,800	\$ 987,100
5. Net Base for 20-Year UAL Amortization (3-4)	\$ 23,834,100	\$ 40,924,800

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION IV - CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level, if any, of contributions are needed to properly maintain the funding status of the plan. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both fairly stable and predictable.

For this plan, the funding method employed is the **Entry Age Normal** actuarial funding method. Under this method, there are three components to the total contribution: the **normal cost contribution**, the **unfunded actuarial liability contribution** (UAL contribution), and the **administrative expense contribution**.

The State normal cost contribution rate is determined in the following steps. First, for each active member, an individual total normal cost rate is determined by taking the value, as of entry age into the Plan, of that member's projected future benefits and dividing it by the value, also at entry age, of the member's expected future salary. Then, this individual total normal cost rate is reduced by the member's contribution rate to produce the State normal cost rate for each member. This State normal cost rate times payroll for each active member equals the State normal cost. The sum of the State normal cost amounts for all active members is then divided by the covered payroll for all active members to produce the State normal cost contribution rate.

The actuarial liability is that portion of the present value of projected benefits that will not be paid by future State normal cost contributions or future member contributions. The difference between this liability and the funds accumulated as of the same date is referred to as the unfunded actuarial liability (UAL).

The UAL amortization payment rate is calculated by amortizing this UAL, after subtracting the present value of scheduled PRI transfers as well, over an open 20-year period. All payments are determined assuming total pay increases by the current annual inflation assumption of 2.50%.

The current assumed administrative expense rate is 0.15% of payroll. This rate, when applied to payroll, is intended to provide an allowance above the cost of funding the benefits to pay for the expense of operating the Plan.

The table below presents and compares the State contribution rates for the Plan based on this funding valuation and the immediately prior one.

Table IV-1		
State Contribution Rate		
Valuation Date	June 30, 2015	June 30, 2016
FY Contribution Rate Payable	FY 2017	FY 2018
State Entry Age Normal Cost Rate	15.08%	15.79%
UAL Amortization Payment Rate	2.96%	5.23%
Administrative Expense Rate	<u>0.15%</u>	<u>0.15%</u>
Actuarially Determined Contributions	18.19%	21.17%

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION IV - CONTRIBUTIONS

Table IV-2 below provides additional detail about the development of the State contribution rate as well as the expected dollar amounts these rates will result in for FY 2018.

Table IV-2 Expected FY 2018 State Contributions		
	In Dollars	As % of Payroll
1. Present Value of Projected Benefits Attributable to:		
a. Total Normal Cost	\$ 13,669,400	22.79%
b. Expected Member Contributions	<u>4,198,600</u>	<u>7.00%</u>
c. State Normal Cost (a) – (b)	\$ 9,470,800	15.79%
2. Amortization of Unfunded Liability	3,137,700	5.23%
3. Allowance for Administrative Expense	<u>90,000</u>	<u>0.15%</u>
4. Total State Actuarially Determined Contributions (1) + (2) + (3)	\$ 12,698,500	21.17%

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION V - ACCOUNTING STATEMENT INFORMATION

ASC Topic No. 960 of the Financial Accounting Standards Board (FASB) requires plans subject to it to disclose certain information regarding their funded status. This plan is not subject to this requirement, but this information is provided for informational purposes. Statement No. 67 of the Governmental Accounting Standards Board (GASB) establishes standards for disclosure of pension information by public employee retirement systems (PERS) and governmental employers in notes to financial statements and supplementary information.

Disclosures based on FASB ASC Topic No. 960 provide a quasi “snap shot” view of how the Plan’s assets compare to its liabilities if contributions stopped and accrued benefit claims had to be satisfied. However, due to potential legal requirements and the possibility that alternative interest rates would have to be used to determine the liabilities, these values may not be a good indication of the amount of money it would take to buy the benefits for all members if the Plan were to terminate and should not be considered a settlement value.

FASB ASC Topic No. 960 specifies that a comparison of the present value of accrued (accumulated) benefits, with the market value of the assets as of the valuation date, must be provided. Again, this plan is not subject to this requirement, but the relevant amounts as of June 30, 2015 and June 30, 2016 are provided for informational purposes and are exhibited in Table V-1, which also includes a reconciliation of liabilities determined as of the prior valuation, July 1, 2015, to the liabilities as of June 30, 2016. These values are based on the June 30, 2016 funding liability results.

This valuation contains information reported in the June 30, 2016 Comprehensive Annual Financial Report (CAFR) of Delaware PERS under GASB Statement No. 67. Disclosures are based on the use of updated procedures to roll forward the 2015 funding valuation results. The calculation of Net Pension Liability in Table V-2 shows the amounts to be disclosed for FY 2016, based on the roll forward of the 2015 funding valuation, as well as a projection of the anticipated FY 2017 disclosures, based on liabilities from the 2016 funding valuation, assuming all actuarial assumptions are met over the coming year. The actual disclosures for FY 2017 will be developed once the asset measure for GASB as of June 30, 2017 is known.

Tables V-3 through V-5 are exhibits to be used for the State’s CAFR. Table V-3 is the Note to Required Supplementary Information, Table V-4 is a history of gains and losses in accrued liability, and Table V-5 is the Solvency Test, which shows the portion of accrued liability covered by the actuarial value of assets. The Government Finance Officers Association (GFOA) has named this exhibit the Solvency Test. None of the liabilities or assets shown are appropriate for settlement purposes. Furthermore, the Solvency Test does not accurately depict a plan’s future financial condition but rather is a test developed by the GFOA to assess the level of funding that relies on the payroll for future hires to pay for the benefits that have already been accrued by the current population. This valuation does not contain the additional disclosures required by GASB Statement No. 68 only for the State’s CAFR.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION V - ACCOUNTING STATEMENT INFORMATION

**Table V-1
Accounting Statement Disclosure and
Reconciliation of Present Value of Accrued Benefits**

	June 30, 2015	June 30, 2016
FASB ASC Topic No. 960 Basis		
1. Present Value of Accrued Benefits		
a. Members Currently Receiving Payments	\$ 153,510,000	\$ 193,065,400
b. Former Vested Members	6,646,100	617,900
c. Active Members	<u>175,637,100</u>	<u>176,642,300</u>
2. Total Present Value of Accrued Benefits (1 (a) + 1(b) + 1(c))	\$ 335,793,200	\$ 370,325,600
3. Market Value of Assets	<u>391,719,200</u>	<u>386,803,700</u>
4. Unfunded Present Value of Accrued Benefits (2 – 3)	\$ (55,926,000)	\$ (16,478,100)
5. Ratio of Market Value of Assets to Present Value of Benefits (3 / 2)	116.7%	104.4%
Reconciliation of Present Value of Accrued Benefits		
Actuarial Present Value of Accrued Benefits at June 30, 2015		\$ 335,793,200
Increase/(Decrease) During Year Attributable to:		
Passage of Time		23,644,200
Benefits Paid – FY 2016		(14,804,100)
Benefit Changes		0
Assumption Changes		(136,000)
PRI		0
Benefits Accrued, Other Gains/Losses		<u>25,828,300</u>
Net Increase/(Decrease)		34,532,400
Actuarial Present Value of Accrued Benefits at June 30, 2016		\$ 370,325,600

DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016

SECTION V - ACCOUNTING STATEMENT INFORMATION

Table V-2		
GASB No. 67 Disclosures		
	June 30, 2016	Estimated June 30, 2017
<u>Total Pension Liability</u>		
Service cost	\$ 13,493,000	\$ 13,669,000
Interest	30,376,000	33,021,000
Changes in benefit terms	0	0
Differences between expected and actual experience	(3,097,000)	8,657,000
Changes in assumptions	2,199,000	0
Benefit payments, including refunds of member contributions	(14,804,000)	(17,165,000)
Net change in Total Pension Liability	\$ 28,167,000	\$ 38,182,000
Total Pension Liability - beginning	\$ 416,570,000	\$ 444,737,000
Total Pension Liability - ending (a)	\$ 444,737,000	\$ 482,919,000
<u>Plan Fiduciary Net Position</u>		
Contributions - Employer	\$ 11,001,000	\$ 10,910,000
Contributions - Non-employer	793,000	591,000
Contributions - Member	4,146,000	4,199,000
Net investment income	(5,960,000)	27,795,000
Benefit payments, including refunds of member contributions	(14,804,000)	(17,165,000)
Administrative expenses	(91,000)	(90,000)
Net change in Plan Fiduciary Net Position	\$ (4,915,000)	\$ 26,240,000
Plan Fiduciary Net Position - beginning	\$ 391,719,000	\$ 386,804,000
Plan Fiduciary Net Position - ending (b)	\$ 386,804,000	\$ 413,044,000
Plan Net Pension Liability (Asset) - ending [(a)-(b)]	\$ 57,933,000	\$ 69,875,000

Items printed in red will be replaced with actual amounts once known at the end of FY 2017.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION V - ACCOUNTING STATEMENT INFORMATION

Table V-3 Note to Required Supplementary Information	
The information presented in the required supplementary schedules was determined as part of the measurement at the date indicated. Additional information as of the latest measurement date follows:	
Measurement date	July 1, 2016
Actuarial cost method	Entry age normal
Amortization method	Percentage of pay - open
Amortization period	20 years
Asset valuation method	Smoothed market, 20% annual market weight
Actuarial assumptions:	
Investment rate of return*	7.2%
Projected salary increases*	2.5% plus merit component based on service
Cost-of-living adjustments	ad hoc
*Includes inflation at	2.50%
The actuarial assumptions used have been recommended by the actuary and adopted by the Plan's Board of Trustees based on the most recent review of the Plan's experience completed in 2016.	
The total rate of State contributions to the Plan is composed of the State normal cost rate, the unfunded actuarial liability amortization payment rate, and the administrative expense rate. The State normal cost rate is a level percent of payroll cost which, along with member contributions, will pay for projected benefits at retirement for each active member. The actuarial liability is that portion of the present value of projected benefits that will not be paid by future State normal costs or future member contributions. The difference between this liability and the funds accumulated as of the same date is the unfunded actuarial liability. The allowance for administrative expenses is based upon the Plan's actual administrative expenses.	

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

SECTION V - ACCOUNTING STATEMENT INFORMATION

**Table V-4
Analysis of Financial Experience**

**Gain and Loss in Accrued Liability During Years Ended June 30
Resulting from Differences Between Assumed Experience and Actual Experience**

*Gain (or Loss) for Year ending June 30,
(expressed in thousands)*

Type of Activity	2011	2012	2013	2014	2015	2016
Investment Income on Actuarial Assets	\$ 481	\$ (2,738)	\$ (461)	\$ 5,759	\$ 783	\$ (6,169)
Combined Liability Experience	<u>5,030</u>	<u>(12,064)</u>	<u>4,887</u>	<u>3,520</u>	<u>2,539</u>	<u>(8,657)</u>
(Loss)/Gain During Year from Financial Experience	\$ 5,511	\$ (14,802)	\$ 4,426	\$ 9,279	\$ 3,322	\$ (14,826)
Non-Recurring Items	<u>(5,996)</u>	<u>(803)</u>	<u>(3,664)</u>	<u>(5,164)</u>	<u>(1,154)</u>	<u>(2,199)</u>
Composite Gain (or Loss) During Year	\$ (485)	\$ (15,605)	\$ 762	\$ 4,115	\$ 2,168	\$ (17,025)

**Table V-5
Solvency Test
Aggregate Accrued Liabilities for**

(expressed in thousands)

Valuation Date June 30,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member State-Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets		
					(1)	(2)	(3)
2016	\$ 56,169	\$ 193,065	\$ 204,159	\$ 411,481	100%	100%	79%
2015	53,739	153,510	206,783	388,587	100	100	88
2014	53,289	132,801	200,434	358,663	100	100	86
2013	49,201	117,660	184,024	317,814	100	100	82
2012	45,534	105,829	173,535	292,262	100	100	81
2011	43,865	81,299	161,726	270,625	100	100	90

**DELAWARE STATE POLICE PENSION PLAN
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APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Data Reconciliation								
	A	P-TDV	P-RET	P-NSR	P-SR	P-SRSU	P-SURV	Total
1. June 30, 2015 valuation	714	20	178	6	17	2	3	940
2. Additions								
(a) New entrants	14		3					17
(b) <u>New Beneficiary/QDRO</u>								
(c) Total	14		3					17
3. Reductions								
(a) Terminated - not vested	(3)							(3)
(b) <u>Paid Out/Expired/Death</u>								
(c) Total	(3)							(3)
4. Changes in status								
(a) P-TDV								
(b) Returned to work								
(c) P-RET	(22)	(11)	33					
(d) P-DIS								
(e) P-LTD								
(f) P-SURV								
(g) <u>Data corrections</u>								
(h) Total	(22)	(11)	33					
5. June 30, 2016 valuation	703	9	214	6	17	2	3	954

A=Active, P-TDV=Terminated Deferred Vested, P-RET=Retired, P-NSR=Disabled, P-SR=Disabled, P-SRSU=Surviving Beneficiary, P-SURV=Surviving Beneficiary

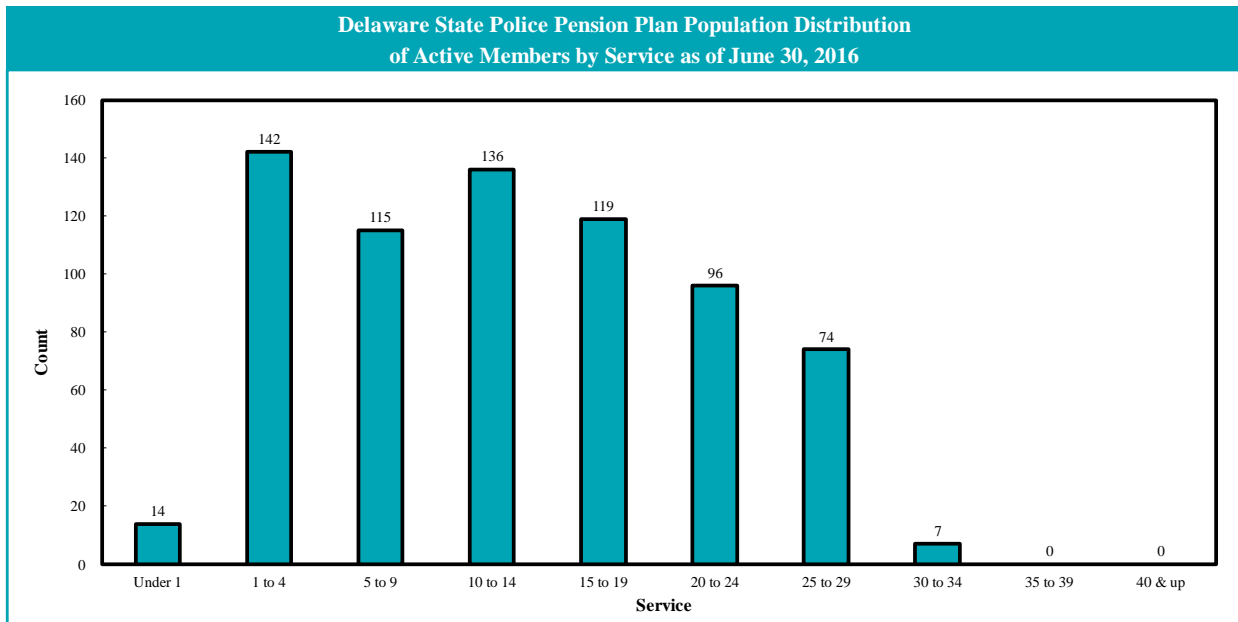
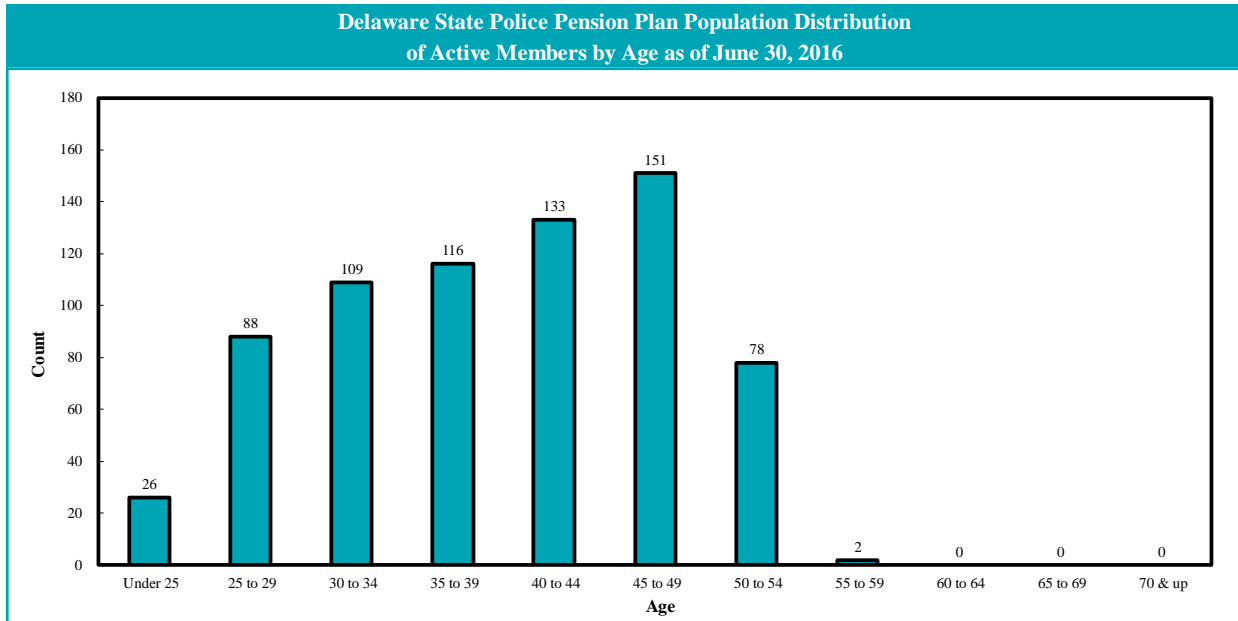
**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Population Distribution of Active Members by Age and Service as of June 30, 2016												
Counts By Age/Service												
Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	5	21	0	0	0	0	0	0	0	0	0	26
25 to 29	6	68	14	0	0	0	0	0	0	0	0	88
30 to 34	3	32	58	16	0	0	0	0	0	0	0	109
35 to 39	0	20	26	58	12	0	0	0	0	0	0	116
40 to 44	0	1	15	39	57	21	0	0	0	0	0	133
45 to 49	0	0	2	19	44	63	23	0	0	0	0	151
50 to 54	0	0	0	4	6	12	50	6	0	0	0	78
55 to 59	0	0	0	0	0	0	1	1	0	0	0	2
60 to 64	0	0	0	0	0	0	0	0	0	0	0	0
65 to 69	0	0	0	0	0	0	0	0	0	0	0	0
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	14	142	115	136	119	96	74	7	0	0	0	703

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

APPENDIX A - MEMBERSHIP INFORMATION



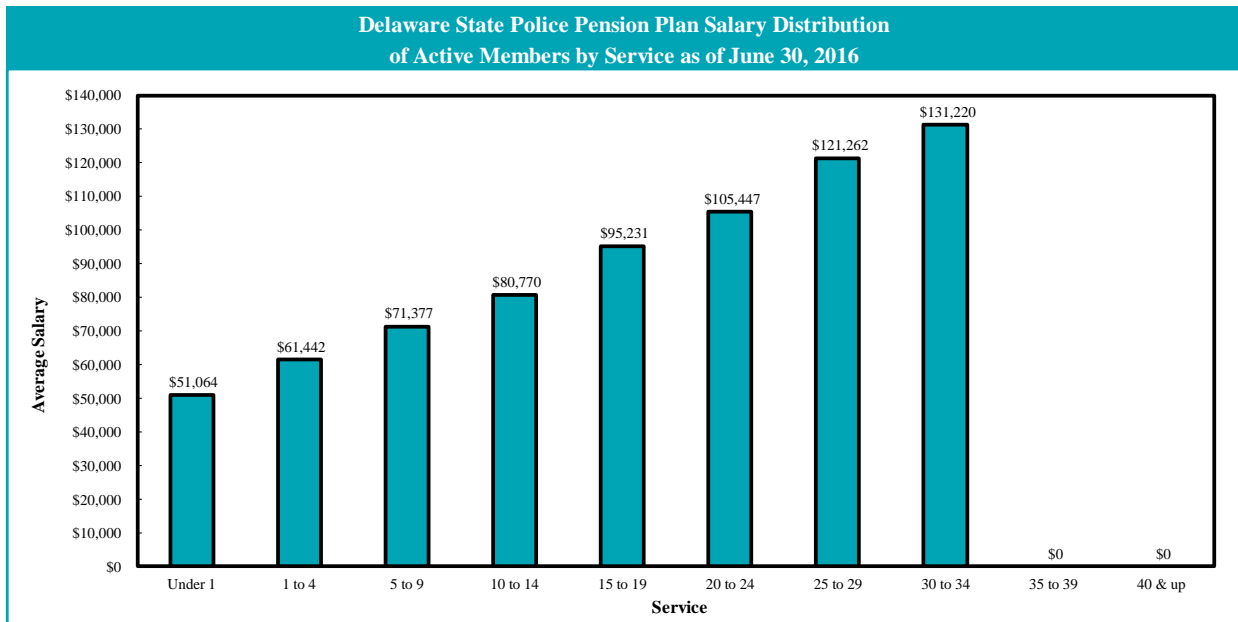
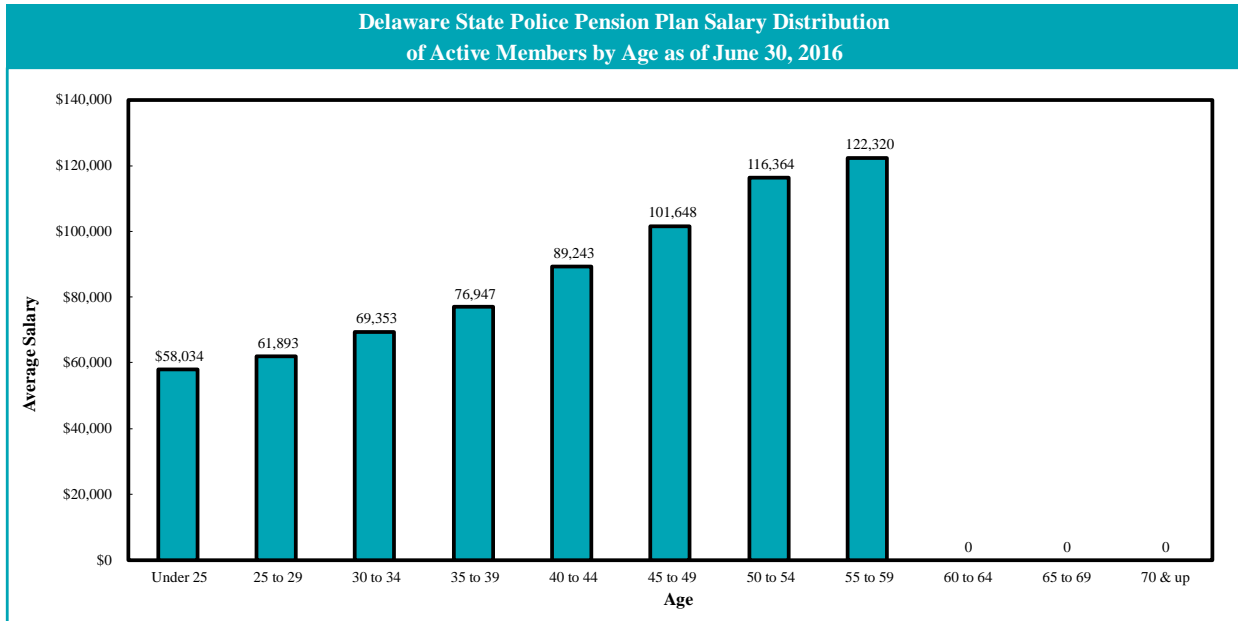
**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Salary Distribution of Active Members by Age and Service as of June 30, 2016												
Average Salary by Age/Service												
Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	\$ 49,854	\$ 59,982	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 58,034
25 to 29	50,743	61,420	68,966	0	0	0	0	0	0	0	0	61,893
30 to 34	53,721	62,649	71,848	76,646	0	0	0	0	0	0	0	69,353
35 to 39	0	60,878	71,996	81,151	94,134	0	0	0	0	0	0	76,947
40 to 44	0	66,223	70,722	82,003	94,176	103,625	0	0	0	0	0	89,243
45 to 49	0	0	71,458	80,005	96,852	106,293	118,606	0	0	0	0	101,648
50 to 54	0	0	0	83,345	95,552	104,194	122,463	132,702	0	0	0	116,364
55 to 59	0	0	0	0	0	0	122,313	122,326	0	0	0	122,320
60 to 64	0	0	0	0	0	0	0	0	0	0	0	0
65 to 69	0	0	0	0	0	0	0	0	0	0	0	0
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
Total	\$ 51,064	\$ 61,442	\$ 71,377	\$ 80,770	\$ 95,231	\$ 105,447	\$ 121,262	\$ 131,220	\$ 0	\$ 0	\$ 0	\$ 85,320

**DELAWARE STATE POLICE PENSION PLAN
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APPENDIX A - MEMBERSHIP INFORMATION



**DELAWARE STATE POLICE PENSION PLAN
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APPENDIX A - MEMBERSHIP INFORMATION

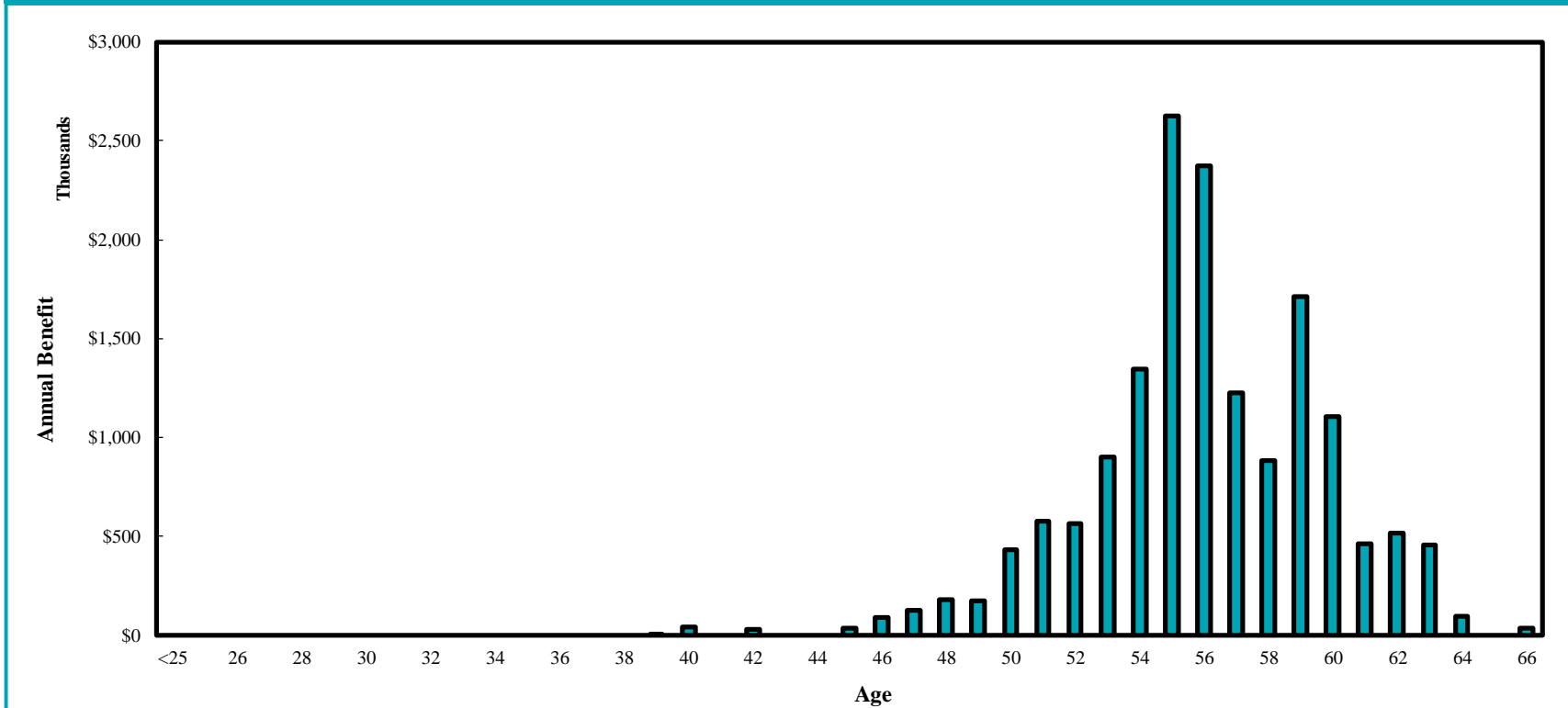
**Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Retired Members, Survivors, and Disabled Members as of June 30, 2016**

Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	0	\$0	73	0	\$0
25	0	\$0	74	0	\$0
26	0	\$0	75	0	\$0
27	0	\$0	76	0	\$0
28	0	\$0	77	0	\$0
29	0	\$0	78	0	\$0
30	0	\$0	79	0	\$0
31	0	\$0	80	0	\$0
32	0	\$0	81	0	\$0
33	0	\$0	82	0	\$0
34	0	\$0	83	0	\$0
35	0	\$0	84	0	\$0
36	0	\$0	85	0	\$0
37	0	\$0	86	0	\$0
38	0	\$0	87	0	\$0
39	1	\$6,364	88	0	\$0
40	1	\$41,258	89	0	\$0
41	0	\$0	90	0	\$0
42	1	\$28,480	91	0	\$0
43	0	\$0	92	0	\$0
44	0	\$0	93	0	\$0
45	1	\$35,598	94	0	\$0
46	2	\$87,961	95	0	\$0
47	2	\$123,558	96	0	\$0
48	5	\$179,865	97	0	\$0
49	3	\$173,746	98	0	\$0
50	7	\$429,335	99	0	\$0
51	9	\$573,255	100	0	\$0
52	8	\$562,388	101	0	\$0
53	13	\$902,142	102	0	\$0
54	20	\$1,342,290	103	0	\$0
55	38	\$2,626,395	104	0	\$0
56	27	\$2,373,933	105	0	\$0
57	16	\$1,223,546	106	0	\$0
58	18	\$881,751	107	0	\$0
59	22	\$1,708,640	108	0	\$0
60	17	\$1,104,527	109	0	\$0
61	9	\$460,453	110	0	\$0
62	10	\$514,019	111	0	\$0
63	9	\$454,816	112	0	\$0
64	2	\$92,497	113	0	\$0
65	0	\$0	114	0	\$0
66	1	\$36,796	115	0	\$0
67	0	\$0	116	0	\$0
68	0	\$0	117	0	\$0
69	0	\$0	118	0	\$0
70	0	\$0	119	0	\$0
71	0	\$0	120	0	\$0
72	0	\$0			
			Totals	242	\$15,963,614

DELAWARE STATE POLICE PENSION PLAN
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APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Retired Members, Beneficiaries, and Disabled Members as of June 30, 2016



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016**

APPENDIX A - MEMBERSHIP INFORMATION

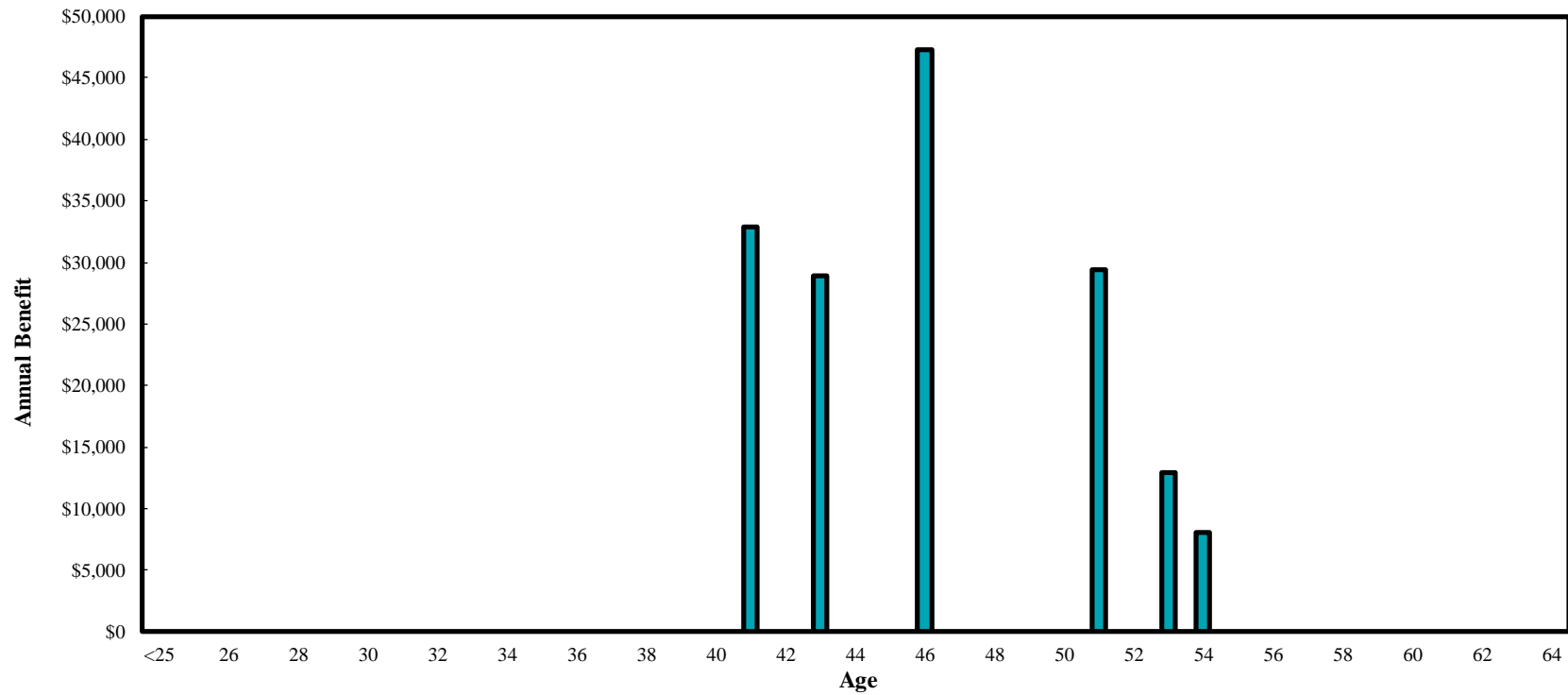
**Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Vested Members as of June 30, 2016**

Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	0	\$0	73	0	\$0
25	0	\$0	74	0	\$0
26	0	\$0	75	0	\$0
27	0	\$0	76	0	\$0
28	0	\$0	77	0	\$0
29	0	\$0	78	0	\$0
30	0	\$0	79	0	\$0
31	0	\$0	80	0	\$0
32	0	\$0	81	0	\$0
33	0	\$0	82	0	\$0
34	0	\$0	83	0	\$0
35	0	\$0	84	0	\$0
36	0	\$0	85	0	\$0
37	0	\$0	86	0	\$0
38	0	\$0	87	0	\$0
39	0	\$0	88	0	\$0
40	0	\$0	89	0	\$0
41	1	\$32,846	90	0	\$0
42	0	\$0	91	0	\$0
43	1	\$28,869	92	0	\$0
44	0	\$0	93	0	\$0
45	0	\$0	94	0	\$0
46	2	\$47,241	95	0	\$0
47	0	\$0	96	0	\$0
48	0	\$0	97	0	\$0
49	0	\$0	98	0	\$0
50	0	\$0	99	0	\$0
51	3	\$29,369	100	0	\$0
52	0	\$0	101	0	\$0
53	1	\$12,915	102	0	\$0
54	1	\$8,014	103	0	\$0
55	0	\$0	104	0	\$0
56	0	\$0	105	0	\$0
57	0	\$0	106	0	\$0
58	0	\$0	107	0	\$0
59	0	\$0	108	0	\$0
60	0	\$0	109	0	\$0
61	0	\$0	110	0	\$0
62	0	\$0	111	0	\$0
63	0	\$0	112	0	\$0
64	0	\$0	113	0	\$0
65	0	\$0	114	0	\$0
66	0	\$0	115	0	\$0
67	0	\$0	116	0	\$0
68	0	\$0	117	0	\$0
69	0	\$0	118	0	\$0
70	0	\$0	119	0	\$0
71	0	\$0	120	0	\$0
72	0	\$0			
			Totals	9	\$159,254

DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2016

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Vested Members as of June 30, 2016



APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

A. Long-Term Assumptions Used to Determine Plan Costs and Liabilities

1. Demographic Assumptions

a. Rates of Mortality

Mortality rates are based on the sex-distinct employee, healthy annuitant, and disabled annuitant mortality tables described below, including adjustment factors applied to the published tables for each group. Future mortality improvements are reflected by applying a custom projection scale on a generational basis to adjusted base tables from the base year shown below.

i. Sample Rates of Mortality for Active Healthy Lives at Selected Ages (number of deaths per 10,000 members):

(2016 Values Shown)		
Age	Male	Female
25	5	2
30	5	2
35	5	3
40	7	4
45	10	6
50	18	11
55	30	17
60	51	25
65	90	37
70	153	64
75	261	110
80	441	190

Rates are based on 110% and 100% of the RP-2014 Total Dataset Employee Mortality Table, respectively, for males and females, using the RP-2014 Total Dataset Healthy Annuitant Mortality Table rates after the end of the Employee Mortality Table, both projected from the 2006 base rates using the RPEC-2015 model, with an ultimate rate of 0.85% for ages 20-85, grading down to an ultimate rate of 0% for ages 115-120, and convergence to the ultimate rate in the year 2020. The valuation uses fully generational projection of mortality improvements. Sample rates shown are those projected through the valuation date.

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APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

**ii. Sample Rates of Mortality for Healthy Annuitant Lives at Selected Ages
(number of deaths per 10,000 members):**

(2016 Values Shown)		
Age	Male	Female
50	44	27
55	62	36
60	84	53
65	119	81
70	185	130
75	302	213
80	508	360
85	885	638
90	1,553	1,138
95	2,447	1,868
100	3,500	2,796

Rates are based on 110% and 100% of the RP-2014 Total Dataset Healthy Annuitant Mortality Table, respectively, for males and females, using the RP-2014 Total Dataset Employee Mortality Table for ages prior to start of the Healthy Annuitant Mortality Table, both projected from the 2006 base rates using the RPEC-2015 model, with an ultimate rate of 0.85% for ages 20-85, grading down to an ultimate rate of 0% for ages 115-120, and convergence to the ultimate rate in the year 2020. The valuation uses fully generational projection of mortality improvements. Sample rates shown are those projected through the valuation date.

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**iii. Sample Rates of Mortality for Disabled Annuitant Lives at Selected Ages
(number of deaths per 10,000 members):**

(2016 Values Shown)		
Age	Male	Female
25	93	28
30	89	35
35	105	49
40	126	67
45	196	105
50	240	138
55	276	174
60	313	207
65	375	252
70	486	342
75	666	502
80	949	757
85	1,411	1,145
90	2,157	1,690
95	3,019	2,453
100	3,973	3,446

Rates are based on 120% of the RP-2014 Total Dataset Disabled Annuitant Mortality Table, projected from the 2006 base rates using the RPEC-2015 model, with an ultimate rate of 0.85% for ages 20-85, grading down to an ultimate rate of 0% for ages 115-120, and convergence to the ultimate rate in the year 2020. The valuation uses fully generational projection of mortality improvements. Sample rates shown are those projected through the valuation date.

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b. Rates of Active Disability

Rates of Active Disability	
Age	Current
20	0.0522%
25	0.0522
30	0.1831
35	0.2694
40	0.3821
45	0.4643
50	0.6214
55	0.8579
60	1.0699

No disabilities are assumed with 20 or more years of service.

1/3 of disabilities are assumed partial disability and 2/3 are assumed total disability.
1/3 of disabilities are assumed duty-related and 2/3 are assumed non-duty related.

c. Termination of Employment (Prior to Normal Retirement Eligibility)

Service-based table applies until eligibility for retirement is reached.

Termination	
Service	Rate
0	5.00%
1	4.00
2-9	1.50
Ultimate	0.50

d. Retirement

Normal Retirement	
Service	Rate
<10	0%
10-19	5
20	10
21-25	5
26-29	20
30-34	50
35+	100

Rates only applied once eligibility for retirement is reached.

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e. Salary Increase

Service-based tables include an annual inflation rate of 2.50%.

Service	Increase
0	11.48%
1	9.48
2	7.49
3	5.99
4	5.74
5	5.74
6	5.49
7	5.24
8	5.00
9	4.75
10+	4.50

f. Family Composition

Female spouses are assumed to be three years younger than males.
80% are assumed married for both male and female employees.

2. Economic Assumptions

- a. Investment Rate of Return: 7.20%
- b. General Wage Increase Rate: 2.50%
- c. Annual Assumed Cost-of-Living Increase Rate for Retirees: 0.00%
- d. Total Payroll Increase Rate (for Amortization): 2.50%
- e. Administrative Expenses as a Percentage of Covered Payroll: 0.15%

3. Rationale for Assumptions

The assumptions were adopted by the Board of Trustees upon the recommendation of the actuary, based on an experience study review performed in 2016 and covering the period July 1, 2010 to June 30, 2015.

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APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

4. Changes Since Last Valuation

As a result of an experience study completed in spring 2016, the following assumptions were changed:

Healthy Inactive, Active and Disabled Mortality
Rates of Active Disability
Termination Employment (Prior to Retirement Eligibility)
Retirement
Salary Increase
Rate of General Wage Increase
Rate of Increase in Total Payroll

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Funding Method

The Entry Age Normal funding method is used to determine costs. Under this funding method, a normal cost rate is determined as a level percent of pay for each active member. The normal cost rate times payroll equals the normal cost for each active member. The normal cost plus member contributions will pay for projected benefits at retirement for each active plan participant.

The actuarial liability is that portion of the present value of projected benefits that will not be paid by future State normal costs or member contributions. The difference between this liability and funds accumulated as of the same date is referred to as the unfunded actuarial liability.

The portion of the actuarial liability in excess of plan assets is amortized to develop an additional cost or savings that is added to each year's State normal cost. Under this cost method, actuarial gains and losses are directly reflected in the size of the unfunded actuarial liability.

The portion of unfunded liability not expected to be paid through PRI transfers is amortized over a rolling 20-year period as a percentage of payroll. PRI transfers are made to pay for each PRI as granted over a five-year period. These transfers are treated as a receivable for purposes of developing the State rate. All payments are determined assuming total payroll increases by the annual inflation rate. Use of a rolling amortization period means that the UAL amount is never anticipated to be fully paid off. This method was chosen to provide for a more level contribution rate over time.

2. Actuarial Value of Assets

For purposes of determining the State contribution rate to the Plan, we use an actuarial value of assets. This asset smoothing method dampens the volatility in asset values that could occur because of fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process.

The actuarial value of assets is a weighted average giving 20% weight to the current market value and 80% weight to the prior year's actuarial value increased by expected interest and contributions and decreased by benefit payments and expenses. This is mathematically equivalent to recognizing 100% of the actuarially assumed interest rate, plus contributions, less payments each year, and 20% of the portion of each year's returns that have not already been reflected in asset values.

3. Changes Since Last Valuation

None

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APPENDIX C - SUMMARY OF PLAN PROVISIONS

This appendix provides a summary of the Plan provisions. Where the Plan, as determined by the State Code and the Plan Rules and Regulations, and this summary differ, the Plan governs.

1. Membership

The Plan covers full-time State Police Officers first hired on or after July 1, 1980.

2. Member Contributions

7% of compensation

Interest is credited at the rate of 5% per year.

Member contributions are made through an “employer pick-up” arrangement which results in deferral of taxes on the contributions.

3. Credited Service

All service as a member plus certain claimed and purchased service

4. Final Average Compensation

Final average compensation (FAC) is the average of any 36 months comprised of three periods of 12 consecutive months (or shorter period of total service) of compensation paid to the member, including salary, wages and fees, plus overtime payments and special payments for extra duty. Overtime payments are excluded for Post-2011 hires.

5. Normal Retirement

Eligibility: (i) Must be employed at 55 with 10 years of credited service, or (ii) any age with 20 years of credited service, or (iii) 10 years of credited service when age plus service equals 75

Benefit: 2.5% of final average compensation multiplied by years of service up to a maximum of 20 years, plus 3.5% of final average compensation multiplied by years of service in excess of 20 years

6. Duty-Connected Disability Benefit

Eligibility: Disabled in the performance of his or her duties

Benefit: If member is totally disabled: 75% of salary at the time disability commences plus 10% for each eligible dependent not to exceed 100%

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APPENDIX C - SUMMARY OF PLAN PROVISIONS

Eligibility: If member is partially disabled: the normal retirement benefit based on credited service at date of disability, but is not less than 50% of salary at the time disability commences

7. Ordinary Disability

Eligibility: Five years of credited service

Benefit: If member is totally disabled: the normal retirement benefit based on credited service at date of disability, but is not less than 50% of the salary at the time of disability plus 5% for each eligible dependent to a maximum of 70%

If member is partially disabled: the normal retirement benefit based on credited service at the date of disability, but is not less than 30% of salary at the time of disability

8. Survivor's Benefit

Eligibility: Death while active or death after retirement

Benefit: For eligible survivors of employees who die in the line of duty: 75% of salary, payable to the primary survivor

For eligible survivors of pensioners who die: the greater of 50% of the member's pension at the time of death or whichever alternative option elected by the deceased retired member

Eligible survivors include: (1) widow or widower, or (2) child or children under 18, or between 18 and 22 and attending school on a full-time basis, or over 18 and permanently disabled before 18, or (3) dependent parent or parents. If there are no eligible survivors, accumulated contributions with interest over aggregate pension payments made are payable to the beneficiary.

9. Burial Benefit

\$7,000 lump sum

10. Vesting

Eligibility: 10 years of credited service.

Benefit: Normal retirement benefit, payable at age 62, based on final average compensation and credited service at date of termination. In lieu of a pension, a member may receive a refund of accumulated contributions with interest. Upon

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APPENDIX C - SUMMARY OF PLAN PROVISIONS

application for a refund of contributions, a member's vested right to a monthly benefit shall be forfeited.

11. Withdrawal

Eligibility: Terminates service and is not eligible for other benefits

Benefit: Accumulated employee contributions with interest

12. Form of Payment

The normal form of payment is a 50% joint and survivor annuity.

As an alternative to the normal form, a member may elect one of the following optional forms of payment upon service retirement or disability:

- 66 2/3% joint and survivor form with a 2% reduction in benefits,
- 75% joint and survivor form with a 3% reduction in benefits, or
- 100% joint and survivor form with a 6% reduction in benefits.

The 66 2/3% and 100% options are only available for retirement on or after January 1, 2015.

13. Cost-of-Living Adjustment

Cost-of-living adjustments are made only on an ad hoc basis.

14. Changes Since Last Valuation

None



Classic Values, Innovative Advice