

Delaware State Police Pension Plan

**Actuarial Valuation
as of June 30, 2019**

Produced by Cheiron

December 2019

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December 19, 2019

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, 2019. 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) 2021 and rely on future plan experience conforming to the underlying assumptions. Future experience may differ significantly from the current experience due to such factors as the following: program experience differing from that anticipated by the assumptions, changes in assumptions, and changes in program provisions or applicable law.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board, including the use of assumptions and methods for funding purposes that comply with the Actuarial Standards of Practice as well as applicable laws and regulations. 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.

Board of Pension Trustees

December 19, 2019

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This report was prepared for the Delaware State Police Pension Plan for the purposes described herein and for the use by the Plan's 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



Fiona E. Liston, FSA, MAAA, EA
Principal Consulting Actuary



Elizabeth Wiley, FSA, FCA, MAAA, EA
Consulting Actuary

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

FOREWORD

Cheiron has performed the annual actuarial valuation of the Delaware State Police Pension Plan (Plan) as of June 30, 2019. 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) 2021, and
- 4) **Provide** certain 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 reviews the primary risks facing the Plan, and quantifies these using various risk and maturity measures.

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

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

Section V presents the FY 2021 actuarially determined contribution.

Section VI includes certain 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 will vary from our results.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION I - BOARD SUMMARY

General Comments

The actuarially determined contribution (ADC) rate was calculated to increase from 24.12% for FY 2020 to 24.83% for FY 2021.

During the year ended June 30, 2019, the Plan's assets earned 4.8% on a market value basis. However, due to the Plan's asset smoothing method, which recognizes portions of investment gains and losses over time, the return on an actuarial value basis was 6.7%. This return was less than the assumed investment rate of return of 7.0% for the prior year, resulting in an actuarial loss on investments of \$1.3 million.

The Plan experienced an actuarial loss on plan liabilities resulting from salary increases different from those assumed and members retiring, terminating, becoming disabled, and dying at rates different from the actuarial assumptions. This liability loss increased the actuarial liability by \$6.6 million. This type of gain or loss is normal in the course of plan experience, as we cannot predict exactly how people will behave.

This valuation report also contains certain information to be reported in the June 30, 2019 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 2018 actuarial valuation liability results. The calculation of net pension liability in Section VI is shown as disclosed for the plan year ending June 30, 2019, based on the 2018 funding actuarial valuation liability results, updated by the roll forward. We also present a projection of the June 30, 2020 disclosure in Section VI, assuming all actuarial assumptions are exactly met over the coming year, which is based on the 2019 funding actuarial valuation liability results.

As of the June 30, 2019 funding actuarial valuation, the Plan's unfunded actuarial liability (UAL) was \$65.7 million. This is an increase from the \$60.2 million UAL in the funding valuation for the prior year.

Effective with the June 30, 2018 valuation, the UAL as of June 30, 2018 is amortized over a closed 20-year period (19 years remaining as of June 30, 2019). Effective with the June 30, 2019 valuation, any new sources of UAL are amortized over a closed 15-year period as a level percentage of payroll.

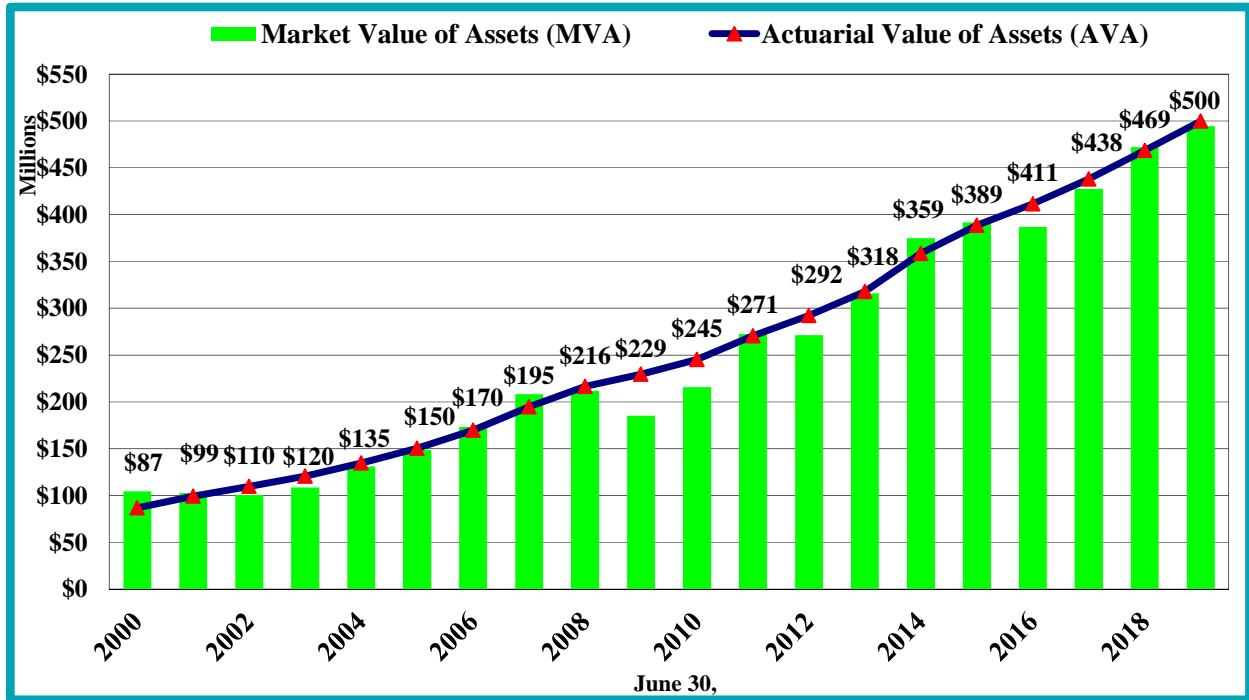
DELAWARE STATE POLICE PENSION PLAN
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SECTION I - BOARD SUMMARY

Trends

Asset Returns

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 smoothed actuarial value measurements. The black labels above the blue line 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 4.8% over the last year. The determination of the Plan’s actuarial value of assets (AVA) for the current year reflects a portion of this return below the 7.0% assumed for the prior year, and continued recognition of prior years’ gains and losses, and thus returned 6.7% over FY 2019.

Over the period July 1, 2000 to June 30, 2019, the Plan’s assets measured using the actuarial value of assets measurements returned a compound 6.7%, compared to the current valuation assumption of 7.0%. On a market value of assets basis, the Plan returned 6.1% over the same period.

**DELAWARE STATE POLICE PENSION PLAN
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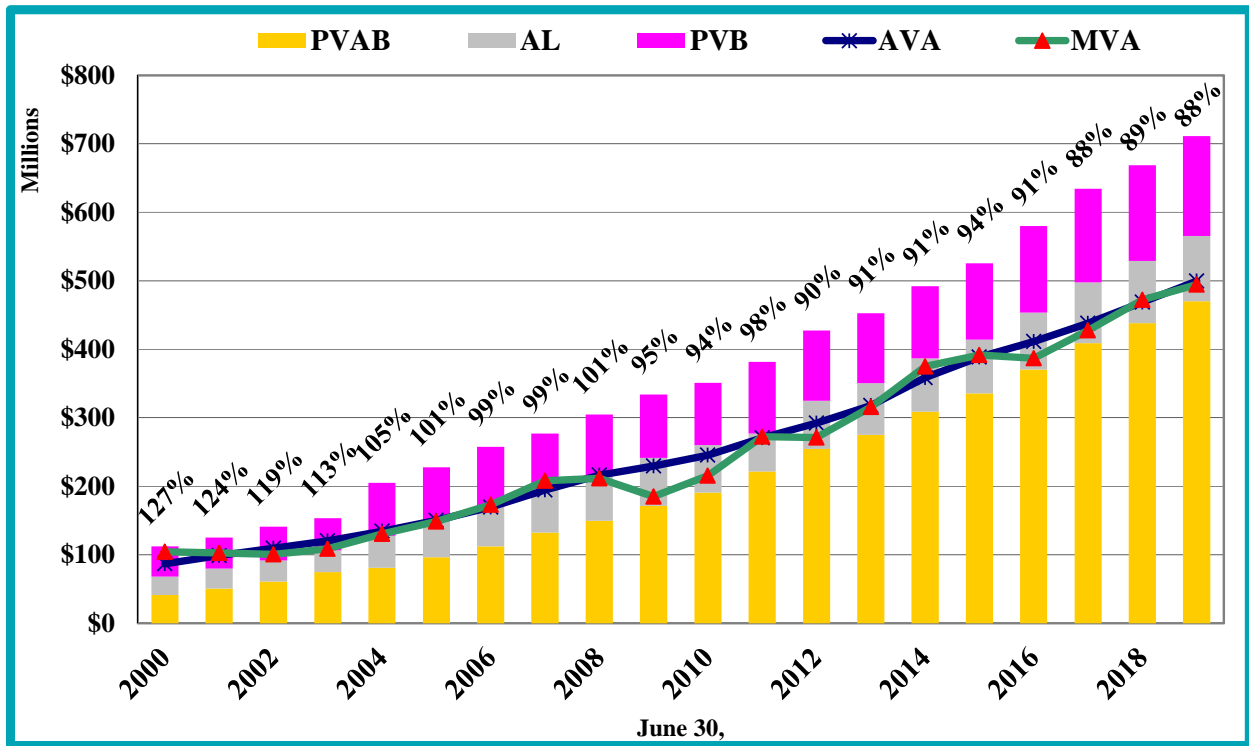
SECTION I - BOARD SUMMARY

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 dates.

The second liability measure shown 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.

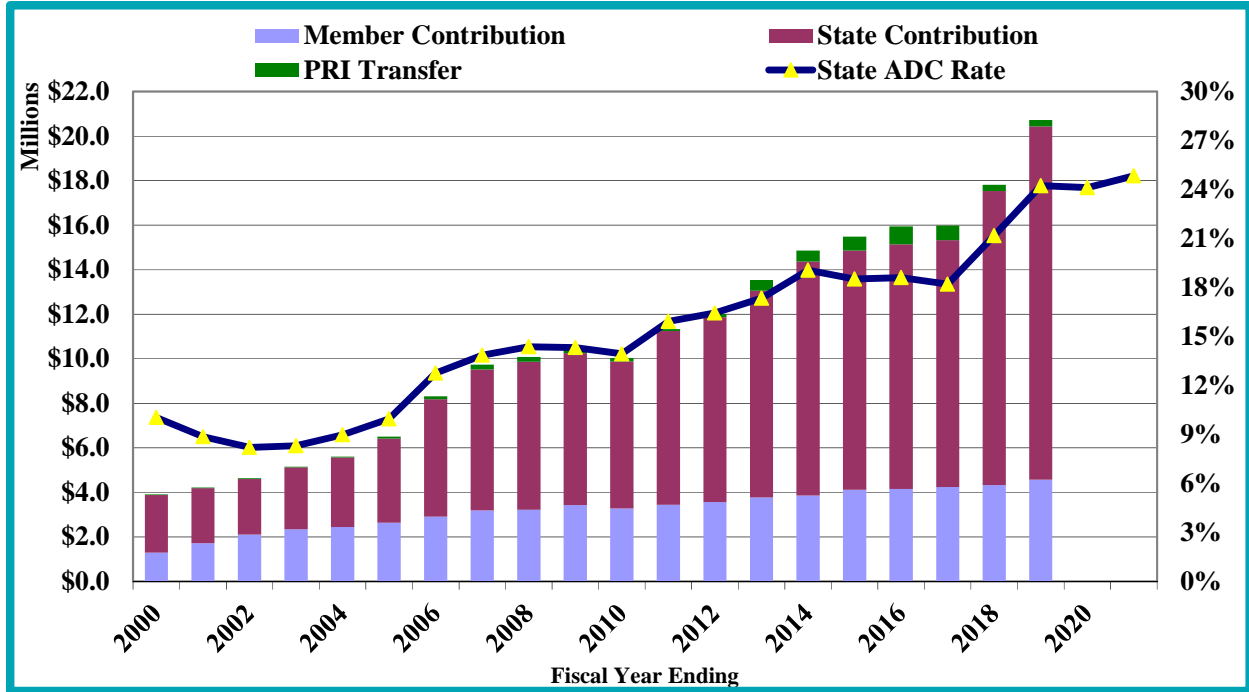
The amount represented by the top of the pink bars, the present value of future benefits (PVB), is the amount needed as of each valuation date to provide all benefits for the current members and their beneficiaries, including reflection of assumed future service and pay increases. If the Plan had assets 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
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SECTION I - BOARD SUMMARY

Contribution Rates



The stacked bars in the graph above show the actual 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 actuarially determined contribution (ADC) rate for each fiscal year as a percentage of payroll and is read using the 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 between the calculation of the State contribution rates shown and when they are payable. For example, the value shown for FY 2019 is the rate prepared by the June 30, 2017 valuation and implemented for the period July 1, 2018 to June 30, 2019. As such, there are two more years of rates shown beyond the years of actual contributions.

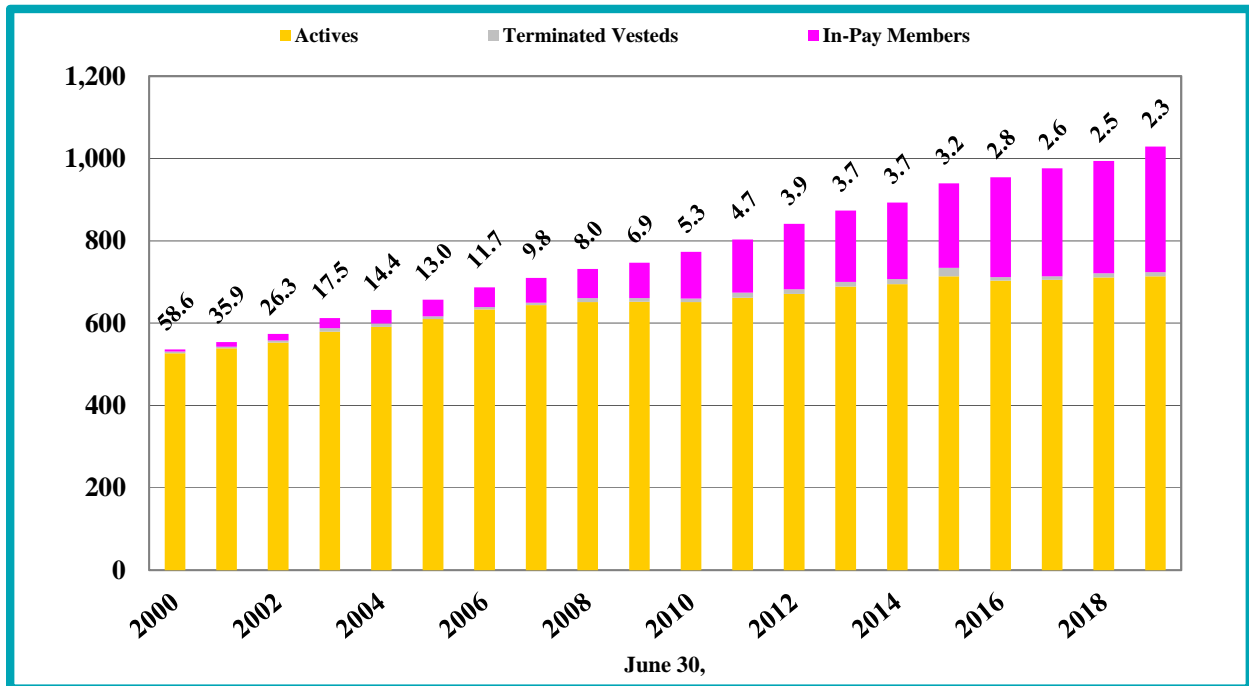
DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019

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 plans, 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 58.6 actives for each inactive in 2000 to 2.3 actives for each inactive in 2019. This 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.

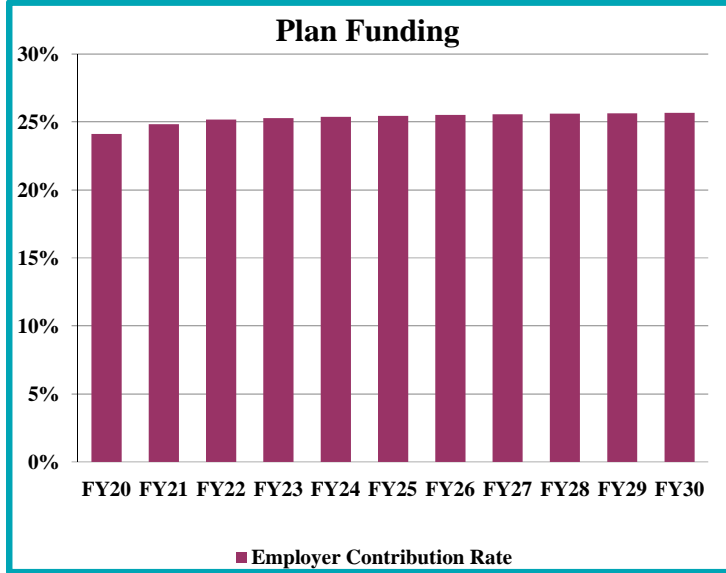


**DELAWARE STATE POLICE PENSION PLAN
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SECTION I - BOARD SUMMARY

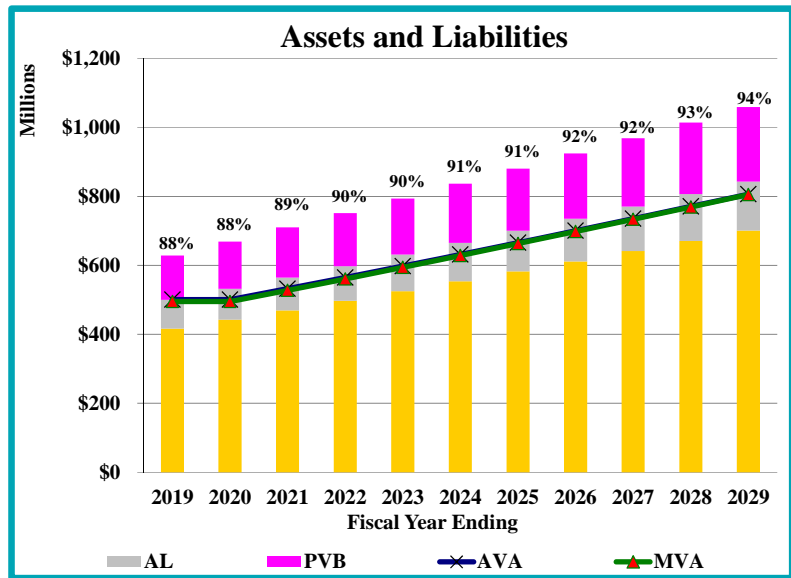
Future Outlook

Baseline Projections



These graphs show the expected progress of the Plan over the next 10 years, assuming the Plan’s assets earn 7.0% on a *market value* basis and assuming all other assumptions are exactly met, including that the actuarially determined contribution (ADC) amounts are made in full. The chart entitled “Plan Funding” shows the projected State ADC rate increasing from 24.1% in FY 2020, determined by the 2018 valuation, to the 24.8% determined by the current valuation, and then increasing to 25.7% at the end of this 10-year period, absent further gains or losses.

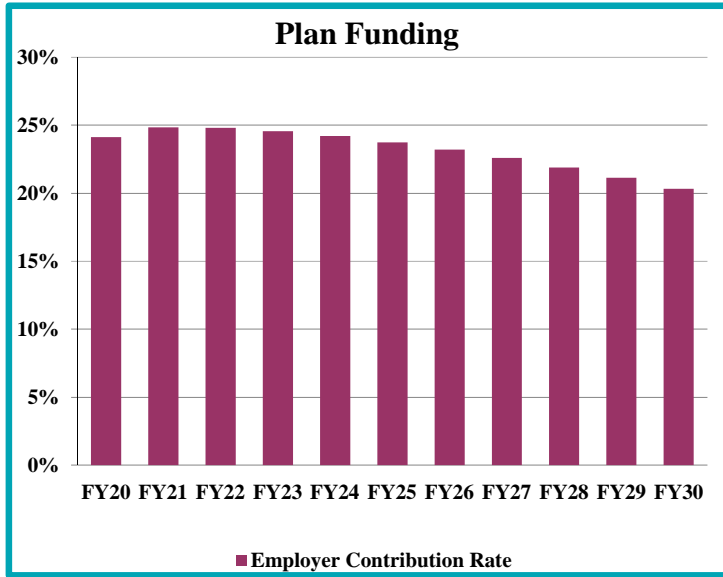
The “Assets and Liabilities” graph shows the projected funded ratios on an actuarial value of assets basis for the Plan over the 10-year projection period. The Plan’s funded status is projected to increase from 88% to 94% over the 10-year projection period, assuming all assumptions are exactly met.



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SECTION I - BOARD SUMMARY

Projections with Asset Returns of 8.0%

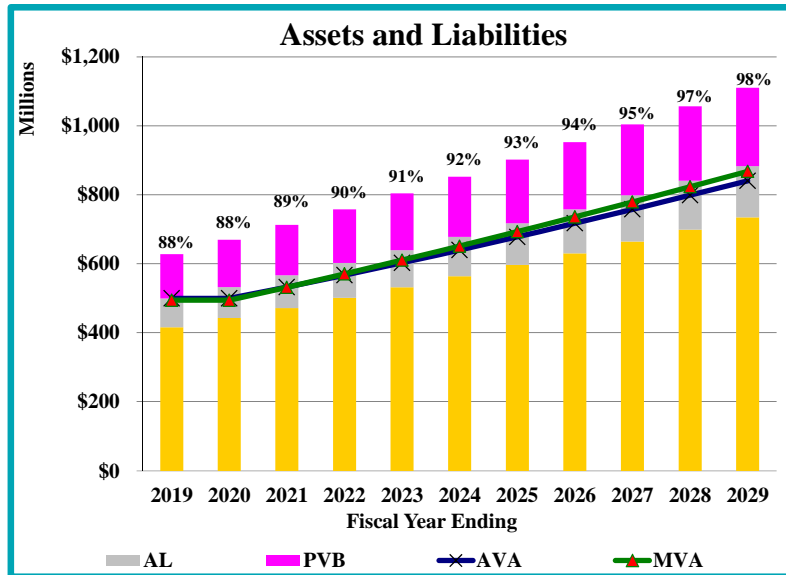


The Plan’s investment earnings will affect the future funding status of the Plan. The two graphs on this page show what the next 10 years are expected to look like if the Plan’s investment performance is 8.0% each year, 1.0% higher than the valuation investment rate of return assumption.

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

The “Plan Funding” graph shows that under this scenario, the State ADC rate would decrease more rapidly than in the baseline case. The rate declines to 20.3% of payroll at the end of the 10-year projection period.

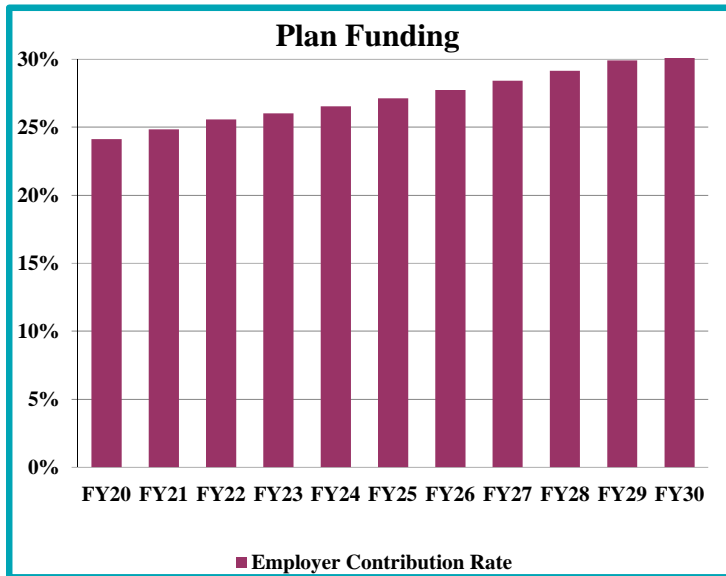
The “Assets and Liabilities” graph shows that under this scenario, the Plan would reach a 98% funded ratio by 2029, an improvement over the baseline scenario’s ultimate ratio of 94%.



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SECTION I - BOARD SUMMARY

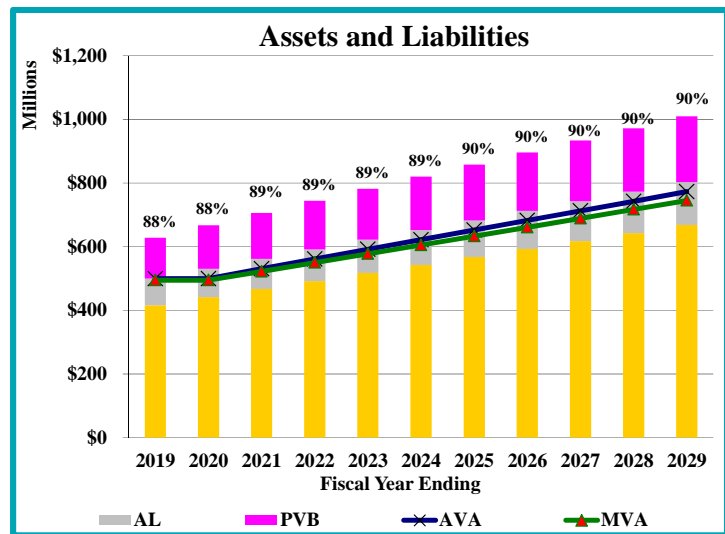
Projections with Asset Returns of 6.0%



The graphs on this page show projections of the Plan’s funding status and contributions assuming that the Plan’s investment performance is 6.0% 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 made equal to the full actuarially determined contribution.

Under this scenario, the State ADC rate increases to approximately 30.7% of payroll by the end the 10-year projection period, significantly greater than the 25.7% ultimate rate in the baseline projection. Additionally, the funded ratio is projected to be lower in this scenario, reaching 90% at the end of the 10-year projection period, significantly lower than the 94% ultimate ratio in the baseline scenario and the same as the current funded ratio.



**DELAWARE STATE POLICE PENSION PLAN
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SECTION I - BOARD SUMMARY

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

Valuation as of:	June 30, 2018	June 30, 2019	% Change
<u>Member Counts</u>			
Active Members	711	714	0.42%
Disabled Members	24	27	12.50%
Retirees and Beneficiaries	259	278	7.34%
Terminated Vested Members	10	10	0.00%
Terminated Non-Vested Members	<u>0</u>	<u>1</u>	N/A
Total Member Counts	1,004	1,030	2.59%
Covered Payroll of Active Members*	\$ 63,629,300	\$ 66,771,000	4.94%
Annual Benefit Payments for Retirees, Disabled Members, and Beneficiaries	\$ 19,473,600	\$ 21,127,500	8.49%
<u>Assets and Liabilities</u>			
Actuarial Liability (AL)	\$ 528,798,700	\$ 565,497,200	6.94%
Actuarial Value of Assets (AVA)	<u>468,589,200</u>	<u>499,808,500</u>	6.66%
Unfunded AL (UAL)	\$ 60,209,500	\$ 65,688,700	9.10%
Funded Ratio on AVA Basis (AVA/AL)	88.6%	88.4%	
Funded Ratio on MVA Basis (MVA/AL)	89.3%	87.4%	
Present Value of Accrued Benefits (PVAB)	\$ 437,997,500	\$ 470,458,200	7.41%
Market Value of Assets (MVA)	<u>472,170,100</u>	<u>494,501,500</u>	4.73%
Unfunded PVAB	\$ (34,172,600)	\$ (24,043,300)	29.64%
Accrued Benefit Funded Ratio (MVA/PVAB)	107.8%	105.1%	
<u>State Contribution Rate</u>			
	Fiscal Year 2020	Fiscal Year 2021	
Entry Age Normal Cost	16.89%	16.90%	
UAL Amortization Payment	7.08%	7.78%	
Administrative Expense	<u>0.15%</u>	<u>0.15%</u>	
Actuarially Determined Contribution (ADC)	24.12%	24.83%	

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

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION II - RISK DISCLOSURE

Actuarial Standard of Practice (ASOP) No. 51 was recently introduced by the Actuarial Standards Board to provide guidance to actuaries regarding assessment and disclosure of risks related to the possibility that actual future measurements of pension plans will deviate from the expected future measurements developed in valuations of them. This standard does not introduce new concepts to actuarial work; it simply attempts to provide some codification of the practice. Our reports have long included that the results of the valuation will vary if the actual experience deviates from the underlying assumptions and methods as well as information about historical variations and projections showing possible future deviations. However, with this ASOP being first effective for this current June 30, 2019 actuarial valuation report, we have taken this as an opportunity to reorganize our reports slightly and consolidate much of the information regarding assessment and disclosure of the risks regarding deviation of actual results from our modelled results in this Section II.

Introduction

The measurements produced by actuarial valuations are dependent on the assumptions about future economic and demographic experience. Based on actuarial standards of practice, the assumptions used represent a reasonable estimate for future experience, but actual future experience will not conform exactly with the assumptions and may differ significantly from the assumed assumptions. Therefore, there is a risk that actual future measurements will differ significantly from expected future measurements as a result of actual experience deviating from that which is assumed.

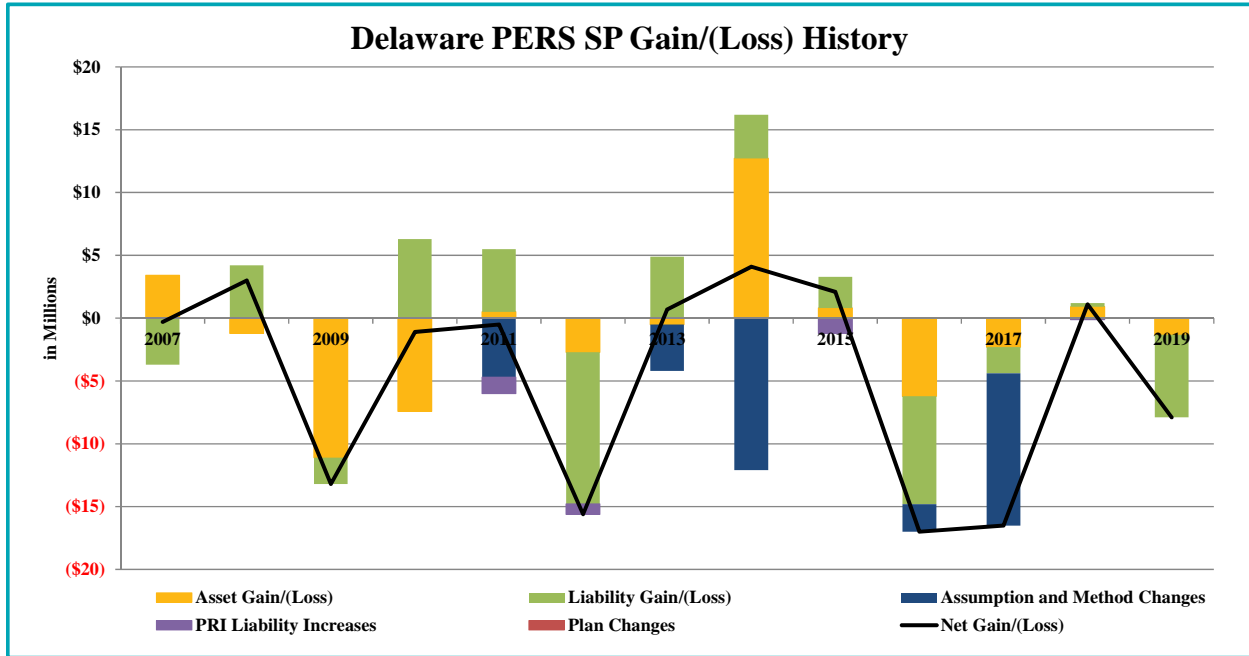
This section of this report is intended to identify the primary drivers of the risk that actual measurements of the Plan will deviate from the measurements expected by this valuation, provide background information about these identified risks, provide assessments of those risks, and communicate the significance of these risks to the future measurements for this plan.

Historical Experience

For this plan, the two primary measurements where there is risk that the actual measurements will significantly differ from the expected future measurements are in the measurements of the liabilities of the Plan and the resulting calculation of the actuarially determined contributions. Therefore, while future experience will not be the same as past experience, it is useful to look at what factors have contributed to the actual liability measurements at each valuation date deviating from that which was predicted by the prior year's valuation. The following graph shows the gains/(losses) for each valuation date between the actual liability measurement and the expected liability broken down by cause.

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SECTION II - RISK DISCLOSURE



This shows that the liability gain/(loss) has been the most significant risk for the Plan over this period in regards to the actual liability measurements deviating from the expected followed closely by the asset gain/(loss). After that, the most significant cause has been the assumption and method changes.

Risk Identification

Considering the specific characteristics of the Plan, the assumptions and methods used in the actuarial valuations for the Plan, and the recent history, we have identified the risks that we think are the most significant in terms of possibly leading to actual values of the measurements deviating from those expected by the valuation process, as follows:

- Investment risk,
- Longevity and other demographic risk, and
- Assumption change risk.

While we have identified these risks as potentially significant in regards to actual measurements deviating from expected, it is possible that there are other risks that we have not identified that will turn out to be significant. For example, while it is possible that the State could start paying contributions other than the actuarially determined contributions and the measurements thus differ as a result of contribution risk, we have not included contribution risk above as this plan has consistently received contributions equal to what is assumed in the valuation process.

Investment Risk is the potential for investment returns to be different than anticipated. In the case of this plan, that is the risk that the returns on assets will be materially different from the 7.0%

**DELAWARE STATE POLICE PENSION PLAN
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SECTION II - RISK DISCLOSURE

that is currently assumed. If actual investment returns are lower than anticipated by the assumptions used in the actuarial valuation, this will increase the unfunded liability measurements and require higher contributions in the future than if the actual returns equaled the assumed returns. On the other hand, if the actual returns are higher than the assumption, the resulting unfunded liability measurements and actuarially determined contributions will be lower than anticipated. As seen in the historical section, this has been a significant driver of deviations in the actual measurements from those expected by the valuations.

Longevity and Other Demographic Risk is the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time as the actual experience deviates from expected and is typically periodically reduced through the Plan's regular actuarial experience process. As such, these risks are often dwarfed by other risks, particularly those due to the investment returns. However, for this plan historically the magnitude of the gains and losses from liability experience have been relatively similar in magnitude to the gains and losses from investment experience.

Assumption Change Risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. Causes of these changes include capital market changes resulting in changes in the assumed rates of return, changes in employee behavior and/or Program provisions requiring changes in the demographic assumptions, and similar. Assumption change risk is an extension of the risks previously identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable. The historical review earlier in this section showed that assumption change risk has been a relatively significant risk for this plan over the recent historical period.

The revisions to the assumed rate of return from 8.0% to 7.5% in 2011, from 7.5% to 7.2% in 2014, and from 7.2% to 7.0% in 2017 constitute the majority of the increases to the unfunded measurements from the expected values as a result of assumption changes. Changes to the demographic assumptions to reflect mortality improvements have also had a relatively significant impact as have changes in the methodology of the funding policy throughout the years. The remaining changes to assumptions have had relatively insignificant impacts.

It is important to note that these changes simply reflect recognizing changes in the expected values of assumptions. If these revisions had not been made, we would anticipate that these amounts would be gradually recognized in the other risks. If future expectations of assumptions such as interest rates or mortality change further, we anticipate similar amounts will have to be recognized.

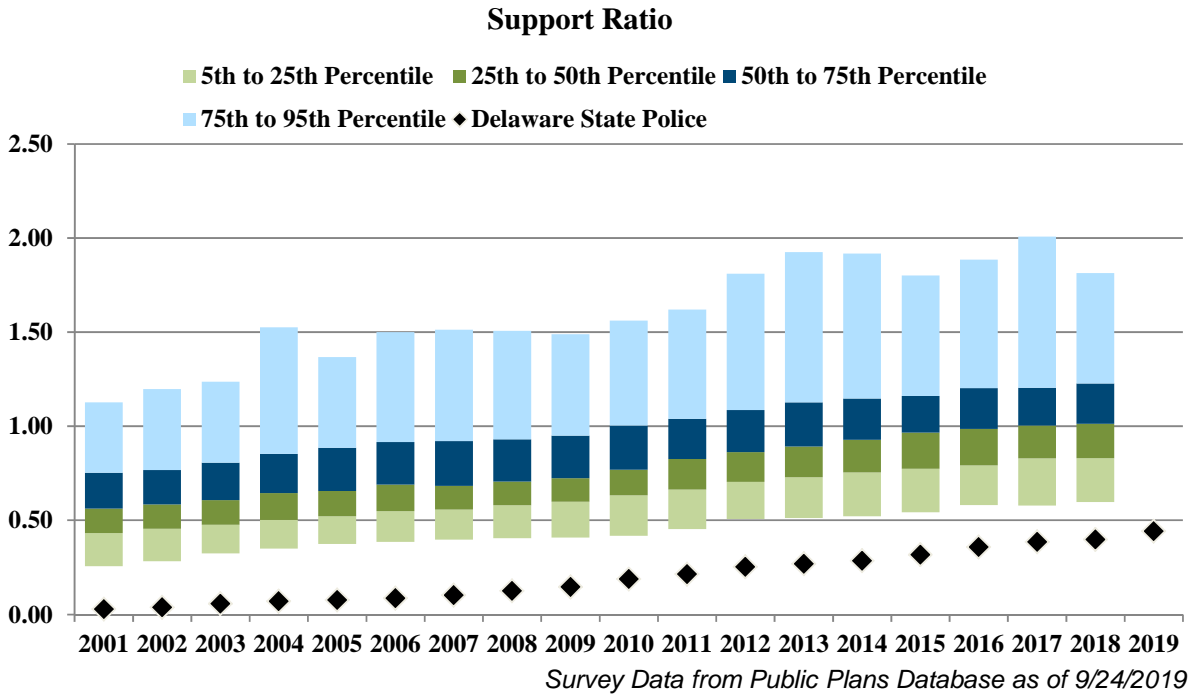
SECTION II - RISK DISCLOSURE

Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified in the previous section than in a less mature plan. Before assessing the risks to the Plan from a forward-looking perspective, it is of value to understand the maturity of the Plan compared to other plans as well as how the Plan’s maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic, the larger the plan is compared to the contribution or revenue base that supports it, the more sensitive the plan will be to risk. There are extensive measures available to assess plan maturity. For this plan, we have examined a number of these and all indicate that the Plan is maturing but is less mature than most of its peers. We have included the most simplistic of these measures as a demonstration of this.

The most simplistic of the Plan maturity measures is the Support Ratio, which is the ratio of the number of inactive members (those receiving benefits currently or entitled to a deferred benefit) to the number of active members. The following graph shows the support ratio over time for the Plan versus a universe of other public plans.



This graph shows the support ratio for the Plan as the diamonds for each year, showing the support ratio has generally increased over time. It also shows, in the bars, the central 90% of the support ratios for the plans in the Public Plans Database as of each year. This database is published by Boston College and contains the majority of state plans as well as many larger municipal plans. This graph shows that Delaware State Police’s support ratio is lower than a

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SECTION II - RISK DISCLOSURE

typical plan, indicating that the Plan is less mature. As of the most recent dates for which the full database is available, the Delaware State Police support ratio has consistently been below the 5th percentile among all plans in the database reflecting the Plan being relatively young.

More Detailed Assessment

A more detailed assessment is always valuable to enhance the understanding of the risks identified above; however the value of this must be compared alongside the costs of such an exercise. The costs in this case are both measureable costs as expressed by the actuarial fees for the additional assessment and the cost of staff time required to support the effort and more intangible costs such as the additional information potentially drowning out the principle findings from the valuation and overwhelming decision makers.

Whether or not to have a more detailed risk assessment performed at this time is the Board's decision, but we do not believe that this additional risk assessment is required at this time based on our understanding of the Board's priorities.

Conclusion

The results of this valuation are based on the assumptions and methodology used within the valuation, and to the extent that actual experience deviates from these, the actual future measurements will deviate from those projected by this valuation. The most significant risks related to this are anticipated to be investment risk, mortality and other demographic risk, and assumption change risk.

**DELAWARE STATE POLICE PENSION PLAN
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SECTION III - 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, 2018 and June 30, 2019,
- Statement of the **changes** in market values during FY 2019,
- 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 III-1 below shows the market values as of June 30, 2018 and June 30, 2019, along with the changes between the two.

Table III-1 Changes in Market Values of Assets		
Market Value of Assets – June 30, 2018		\$ 472,170,100
<u>Additions</u>		
Member Contributions	\$ 4,565,200	
State Contributions	15,869,800	
PRI Transfers	289,600	
Other	-	
Investment Returns	22,578,200	
Total Additions	\$ 43,302,800	
<u>Deductions</u>		
Benefit Payments	\$ 20,865,200	
Administrative Expenses	106,200	
Total Deductions	\$ 20,971,400	
Market Value of Assets – June 30, 2019		\$ 494,501,500

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SECTION III - 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, 2019.

Table III-2 Development of Actuarial Value of Assets		
1.	Actuarial Value of Assets at June 30, 2018	\$ 468,589,200
2.	Amount in (1) with interest to June 30, 2019 at 7.0% per year	501,390,500
3.	State, PRI, and member contributions for FY 2019	20,724,600
4.	Interest on contributions assuming payments made uniformly throughout the year to June 30, 2019 at 7.0% per year	713,100
5.	Disbursements from Trust except investment expenses, July 1, 2018 through June 30, 2019	20,971,400
6.	Interest on disbursements to June 30, 2019 at 7.0% per year	<u>721,600</u>
7.	Expected Actuarial Value of Assets at June 30, 2019 = (2) + (3) + (4) – (5) – (6)	\$ 501,135,200
8.	Actual Market Value of Assets at June 30, 2019	<u>\$ 494,501,500</u>
9.	Excess of (8) over (7)	\$ (6,633,700)
10.	Actuarial Value of Assets at June 30, 2019 = (7) + 20% of (9)	\$ 499,808,500

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION III - ASSETS

Investment Performance

The market value of assets (MVA) returned 4.8% during 2019, which is less than the prior year's assumed 7.0% investment rate of return. The actuarial value of assets (AVA) returned 6.7% over this same year, reflecting the asset smoothing methodology being utilized by the Plan for the measurement of the actuarial value of assets. Since a maximum of 20% of the gain or loss from the performance of the Plan is typically recognized in a given year under the adopted 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 III-3 Cash Flow Projections		
Year Beginning July 1,	Expected Benefit Payments	Expected Contributions*
2019	\$ 22,757,000	\$ 20,936,000
2020	25,486,000	21,785,000
2021	27,926,000	22,329,000
2022	30,306,000	22,887,000
2023	32,775,000	23,460,000
2024	35,323,000	24,046,000
2025	38,118,000	24,647,000
2026	40,920,000	25,263,000
2027	43,653,000	25,895,000
2028	46,343,000	26,542,000

* Expected contributions include State contributions, member contributions, State reimbursement, 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, 2019. Projecting any further than 10 years using a closed group would not yield reliable projections 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, 2019**

SECTION IV - 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, 2018 and June 30, 2019, 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 fully 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. However, it is not 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 7.0% per year.

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, 2019

SECTION IV - LIABILITIES

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

	June 30, 2018	June 30, 2019
<u>Present Value of Benefits</u>		
Active Member Benefits	\$ 429,680,800	\$ 453,755,900
Retiree, Beneficiary, Disabled, and Terminated Members Benefits	<u>239,053,200</u>	<u>257,274,800</u>
Present Value of Benefits (PVB)	\$ 668,734,000	\$ 711,030,700
Market Value of Assets (MVA)	\$ 472,170,100	\$ 494,501,500
Future Member Contributions	40,948,100	42,551,000
Future State Contributions & PRI Fund Transfers	<u>155,615,800</u>	<u>173,978,200</u>
Total Resources	\$ 668,734,000	\$ 711,030,700
<u>Actuarial Liability</u>		
Present Value of Benefits (PVB)	\$ 668,734,000	\$ 711,030,700
Present Value of Future State Normal Costs (PVFNC)	98,987,200	102,982,500
Present Value of Future Member Contributions (PVFEEC)	<u>40,948,100</u>	<u>42,551,000</u>
Actuarial Liability (AL=PVB-PVFNC-PVFEEC)	\$ 528,798,700	\$ 565,497,200
Actuarial Value of Assets (AVA)	<u>468,589,200</u>	<u>499,808,500</u>
Net (Surplus)/Unfunded AL (AL - AVA)	\$ 60,209,500	\$ 65,688,700
<u>Present Value of Accrued Benefits</u>		
Present Value of Benefits (PVB)	\$ 668,734,000	\$ 711,030,700
Present Value of Future Benefit Accruals (PVFBA)	<u>230,736,500</u>	<u>240,572,500</u>
Present Value of Accrued Benefits (PVAB=PVB-PVFBA)	\$ 437,997,500	\$ 470,458,200
Market Value of Assets (MVA)	\$ 472,170,100	\$ 494,501,500
Net (Surplus)/Unfunded PVAB (PVAB - MVA)	\$ (34,172,600)	\$ (24,043,300)

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION IV - 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 methodology 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 the liabilities since the last valuation, in thousands.

Table IV-2 Liability Changes			
(In Thousands)	Present Value of Benefits	Actuarial Liability	Present Value of Accrued Benefits
Liabilities June 30, 2018	\$ 668,734	\$ 528,799	\$ 437,998
Liabilities June 30, 2019	711,031	565,497	470,458
Liability Increase/(Decrease)	42,297	36,698	32,460
Change Due to:			
PRI	0	0	0
Actuarial (Gain)/Loss	NC *	4,998	NC *
Benefit Changes	0	0	0
Assumption Changes	0	0	0
Benefits Accumulated and Other (Gain)/Loss	42,297	31,700	32,460

* NC = not calculated.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION IV - LIABILITIES

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

Table IV-3 Actuarial Liabilities for Funding		
	June 30, 2018	June 30, 2019
1. Actuarial Liabilities		
Retiree, Beneficiary, Disabled, and Terminated Members	\$ 239,053,200	\$ 257,274,800
Active Members	<u>289,745,500</u>	<u>308,222,400</u>
Total Actuarial Liability (AL)	\$ 528,798,700	\$ 565,497,200
2. Actuarial Value of Assets (AVA)	\$ 468,589,200	\$ 499,808,500
3. Unfunded Actuarial Liability (UAL) [AL – AVA]	\$ 60,209,500	\$ 65,688,700
4. Present Value of Outstanding PRI Transfers	\$ 416,200	\$ 146,600
5. One-time Retiree Payout to be Reimbursed by State	\$ 104,800	N/A
6. Outstanding Base for 20-Year UAL Amortization (19 Years Remaining as of June 30, 2019)	\$ 59,688,500	\$ 59,208,000
7. Net Base for 15-Year UAL Amortization (3-4-5-6)	N/A	\$ 6,334,100

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION V - 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 and the reimbursement for one-time retiree benefits, over a 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 V-1 State Contribution Rate		
Valuation Date	June 30, 2018	June 30, 2019
FY Contribution Rate Payable	FY 2020	FY 2021
State Entry Age Normal Cost Rate	16.89%	16.90%
UAL Amortization Payment Rate	7.08%	7.78%
Administrative Expense Rate	<u>0.15%</u>	<u>0.15%</u>
Actuarially Determined Contributions	24.12%	24.83%

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION V - CONTRIBUTIONS

Table V-2 below provides additional detail about the development of the actuarially determined State contribution rate as well as the expected dollar amounts these rates will result in for FY 2021.

Table V-2 Expected FY 2021 State Contributions		
	In Dollars	As % of Payroll
1. Present Value of Projected Benefits Attributable to:		
a. Total Normal Cost	\$ 15,958,200	23.90%
b. Expected Member Contributions	<u>4,673,900</u>	<u>7.00%</u>
c. State Normal Cost (a) – (b)	\$ 11,284,300	16.90%
2. Amortization of Unfunded Liability		
a. 19 year Amortization of 2018 UAL	4,616,300	6.91%
b. 15 Year Amortization of 2019 Base	<u>580,000</u>	<u>0.87%</u>
c. Total UAL Amortization	5,196,400	7.78%
3. Allowance for Administrative Expense	<u>100,200</u>	<u>0.15%</u>
4. Total State Actuarially Determined Contributions (1) + (2) + (3)	\$ 16,580,900	24.83%

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION VI - 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, 2018 and June 30, 2019 are provided for informational purposes and are exhibited in Table VI-1, which also includes a reconciliation of liabilities determined as of the prior valuation, July 1, 2018, to the liabilities as of June 30, 2018. These values are based on the funding liability results.

This valuation contains information reported in the June 30, 2019 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 2018 funding valuation results. The calculation of Net Pension Liability in Table VI-2 shows the amounts to be disclosed for FY 2019, based on the liabilities of the roll forward of the 2018 funding valuation, as well as a projection of the anticipated FY 2020 disclosures, based on liabilities from the 2019 funding valuation, assuming all actuarial assumptions are met over the coming year. The actual disclosures for FY 2020 will be developed once the asset measure for GASB as of June 30, 2020 is known.

Tables VI-3 through VI-5 are exhibits to be used for the State’s CAFR. Table VI-3 is the Note to Required Supplementary Information. Table VI-4 is a history of gains and losses in accrued liability, and Table VI-5 is the Schedule of Funded Liabilities by Type, 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 Schedule of Funded Liabilities by Type. None of the liabilities or assets shown are appropriate for settlement purposes. Furthermore, the Schedule of Funded Liabilities by Type 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, 2019**

SECTION VI - ACCOUNTING STATEMENT INFORMATION

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

	June 30, 2018	June 30, 2019
FASB ASC Topic No. 960 Basis		
1. Present Value of Accrued Benefits (PVAB)		
a. Members Currently Receiving Payments	\$ 238,246,600	\$ 256,422,500
b. Former Vested Members	806,600	852,300
c. Active Members	<u>198,944,300</u>	<u>213,183,400</u>
2. Total PVAB [1(a) + 1(b) + 1(c)]	\$ 437,997,500	\$ 470,458,200
3. Market Value of Assets (MVA)	<u>472,170,100</u>	<u>494,501,500</u>
4. Unfunded PVAB [2 – 3]	\$ (34,172,600)	\$ (24,043,300)
5. Ratio of MVA to PVAB [3 / 2]	107.8%	105.1%
Reconciliation of PVAB		
PVAB at June 30, 2018		\$ 437,997,500
Increase/(Decrease) During Year Attributable to:		
Passage of Time		29,941,900
Benefits Paid – FY 2019		(20,865,200)
Benefit Changes		0
Assumption Changes		0
PRI		0
Benefits Accrued, Other Gains/Losses		<u>23,384,000</u>
Net Increase/(Decrease)		32,460,700
PVAB at June 30, 2019		\$ 470,458,200

DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019

SECTION VI - ACCOUNTING STATEMENT INFORMATION

Table VI-2
GASB No. 67 Disclosures

	June 30, 2019	Estimated June 30, 2020
<u>Total Pension Liability (TPL)</u>		
Service cost	\$ 15,203,000	\$ 15,958,000
Interest	37,363,000	39,919,000
Changes in benefit terms	0	0
Differences between expected and actual experience	(305,000)	4,998,000
Changes in assumptions	0	0
Benefit payments, including refunds of member contributions	(20,866,000)	(22,738,000)
Net change in TPL	\$ 31,395,000	\$ 38,137,000
TPL - beginning	\$ 529,104,000	\$ 560,499,000
TPL - ending (a)	\$ 560,499,000	\$ 598,636,000
<u>Fiduciary Net Position (FNP)</u>		
Contributions – State	\$ 15,870,000	\$ 16,105,000
Contributions - Non-employer	290,000	157,000
Contributions - Member	4,565,000	4,674,000
Net investment income	22,578,000	34,550,000
Benefit payments, including refunds of member contributions	(20,866,000)	(22,738,000)
Administrative expenses	(106,000)	(100,000)
Net change in FNP	\$ 22,331,000	\$ 32,648,000
FNP - beginning	\$ 472,170,000	\$ 494,501,000
FNP - ending (b)	\$ 494,501,000	\$ 527,149,000
Net Pension Liability/(Asset) - ending [(a)-(b)]	\$ 65,998,000	\$ 71,487,000

Items printed in red will be replaced with actual amounts once known at the end of FY 2020.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

SECTION VI - ACCOUNTING STATEMENT INFORMATION

Table VI-3

Note to Required Supplementary Information

The June 30, 2018 total pension liability presented in Table VI-2 was determined as part of the measurement at the date indicated. Additional information as of the latest measurement date follows:

Measurement date:	July 1, 2019
Valuation date:	July 1, 2018
Actuarial cost method:	Entry age normal
Actuarial assumptions:	
Investment rate of return*	7.0%
Projected salary increases*	2.5% plus merit component based on service
Cost-of-living adjustments	ad hoc
* Includes inflation at	2.50%

The actuarially determined contribution for fiscal year 2020 will use the contribution rate developed in Section V of this valuation. It was determined using the measurement date and key assumptions that follow:

Measurement date:	July 1, 2019
Valuation date:	July 1, 2019
Actuarial cost method:	Entry age normal
Amortization method:	Percentage of pay – closed Pay increases at 2.5% per year
Amortization period:	Equivalent single Amortization period
Asset valuation method:	Smoothed market, 20% annual market weight
Actuarial assumptions:	
Investment rate of return*	7.0%
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 economic assumptions were updated first effective with the 2017 valuation based on the Board’s annual review of these assumptions.

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 expenses rate. The State normal cost rate is a level percent of payroll cost that, 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, 2019**

SECTION VI - ACCOUNTING STATEMENT INFORMATION

**Table VI-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**

Type of Activity	<i>Gain (or Loss) for Year Ending June 30, (expressed in thousands)</i>					
	2014	2015	2016	2017	2018	2019
Investment Income on Actuarial Assets	\$ 5,759	\$ 783	\$ (6,169)	\$ (2,338)	\$ 895	\$ (1,327)
Combined Liability Experience	<u>3,520</u>	<u>2,539</u>	<u>(8,657)</u>	<u>(2,055)</u>	<u>305</u>	<u>(4,998)</u>
(Loss)/Gain during Year from Financial Experience	\$ 9,279	\$ 3,322	\$ (14,826)	\$ (4,393)	\$ 1,200	\$ (6,325)
Non-Recurring Items	<u>(5,164)</u>	<u>(1,154)</u>	<u>(2,199)</u>	<u>(12,092)</u>	<u>0</u>	<u>0</u>
Composite Gain (or Loss) during Year	\$ 4,115	\$ 2,168	\$ (17,025)	\$ (16,485)	\$ 1,200	\$ (6,325)

**Table VI-5
Schedule of Funded Liabilities by Type
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)
2019	\$ 65,698	\$ 256,423	\$ 243,376	\$ 499,809	100%	100%	73%
2018	62,244	238,247	228,308	465,589	100	100	74
2017	59,849	213,938	223,748	437,917	100	100	73
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

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Data Reconciliation									
	A	P-TDV	P-SUPP	P-RET	P-NSR	P-SR	P-SRSU	P-SURV	Total
1. June 30, 2018 valuation	711	9	1	251	6	18	2	6	1,004
2. Additions									
(a) New entrants	30	1		2					33
(b) <u>New Beneficiary/QDRO</u>									
(c) Total	30	1		2					33
3. Reductions									
(a) Terminated - not vested	(8)								(8)
(b) <u>Paid Out/Expired/Death</u>									
(c) Total	(8)								(8)
4. Changes in status									
(a) P-TDV									
(b) P-SUPP									
(c) Returned to work									
(d) P-RET	(17)			17					
(e) P-NSR	(1)				1				
(f) P-DIS									
(g) P-LTD									
(h) P-SURV									
(i) PSUR25									
(j) P-SR	(1)	(1)				2			
(k) <u>Data corrections</u>									
(l) Total	(19)	(1)		17	1	2			
5. June 30, 2019 valuation	714	9	1	270	7	20	2	6	1,029

A=Active, P-TDV=Terminated Deferred Vested, P-SUPP=Terminated Deferred Vested, P-RET=Retired, PRET25=Retired, P-NSR=Disabled, P-LTD=Long-Term Disabled, P-SURV=Surviving Beneficiary, PSUR25=Surviving Beneficiary, P-SR=Disabled

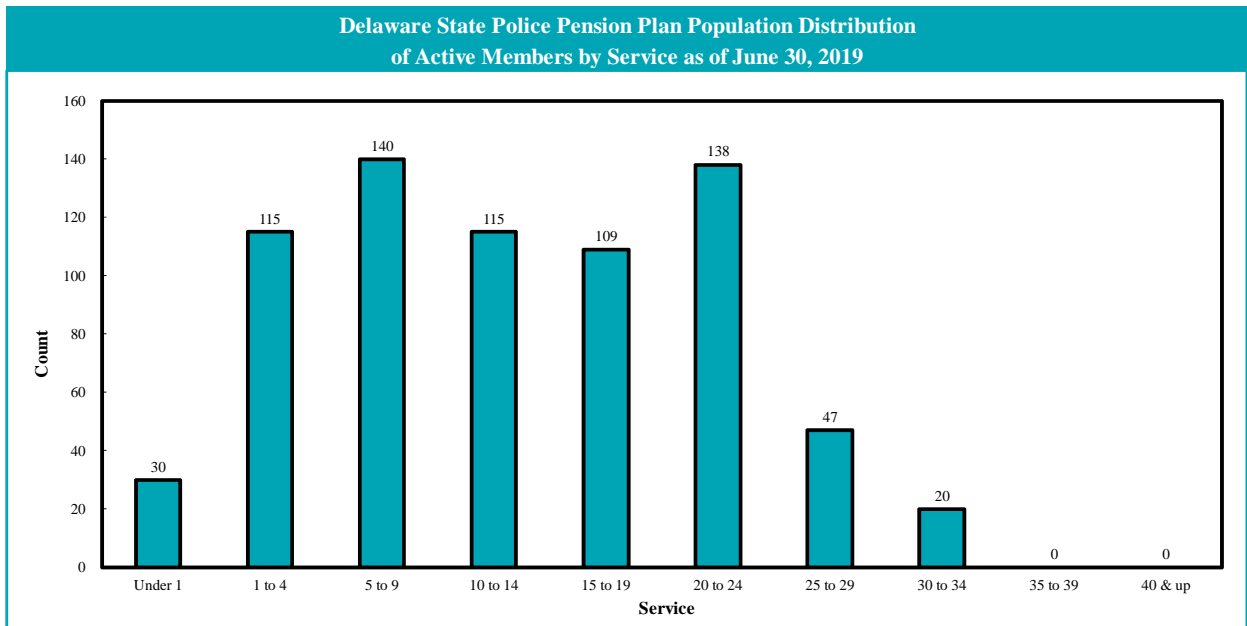
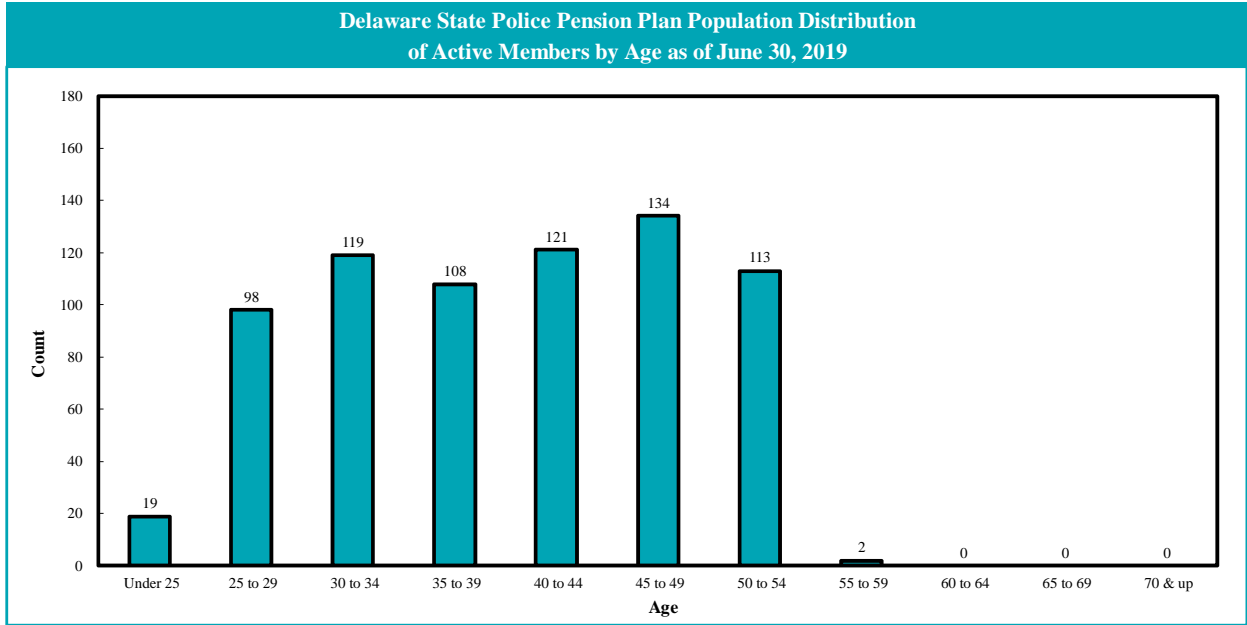
**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Population Distribution of Active Members by Age and Service as of June 30, 2019												
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	8	11	0	0	0	0	0	0	0	0	0	19
25 to 29	15	60	23	0	0	0	0	0	0	0	0	98
30 to 34	7	34	68	10	0	0	0	0	0	0	0	119
35 to 39	0	6	24	64	14	0	0	0	0	0	0	108
40 to 44	0	4	22	26	54	15	0	0	0	0	0	121
45 to 49	0	0	3	12	31	80	8	0	0	0	0	134
50 to 54	0	0	0	3	9	42	39	20	0	0	0	113
55 to 59	0	0	0	0	1	1	0	0	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	30	115	140	115	109	138	47	20	0	0	0	714

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX A - MEMBERSHIP INFORMATION



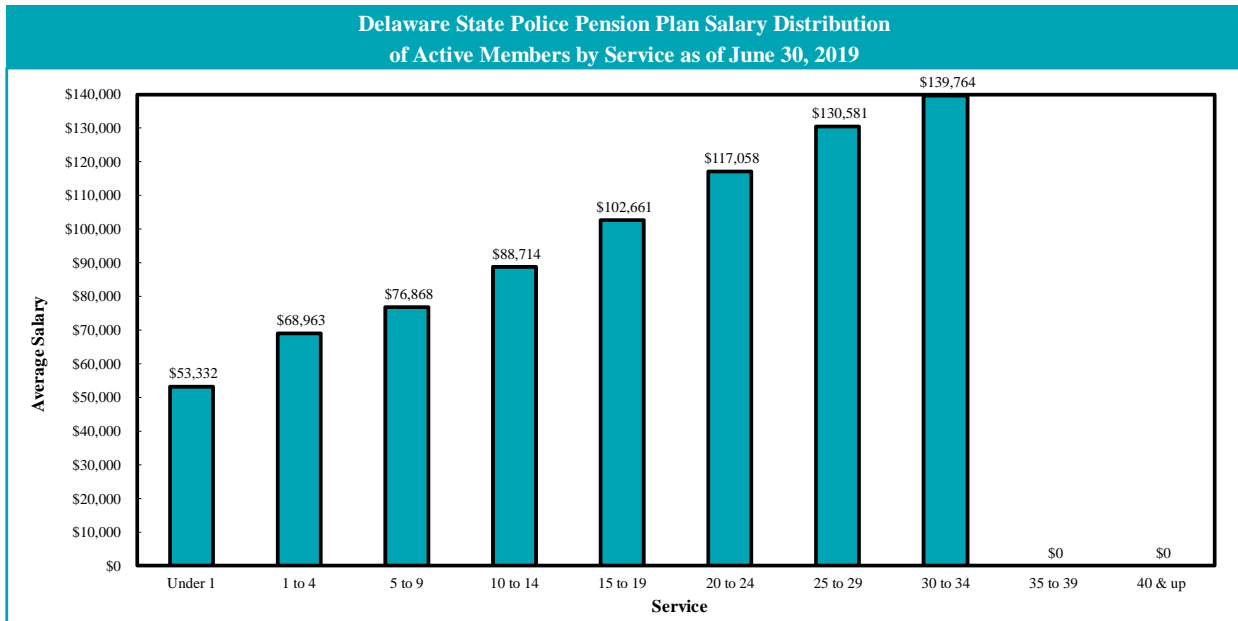
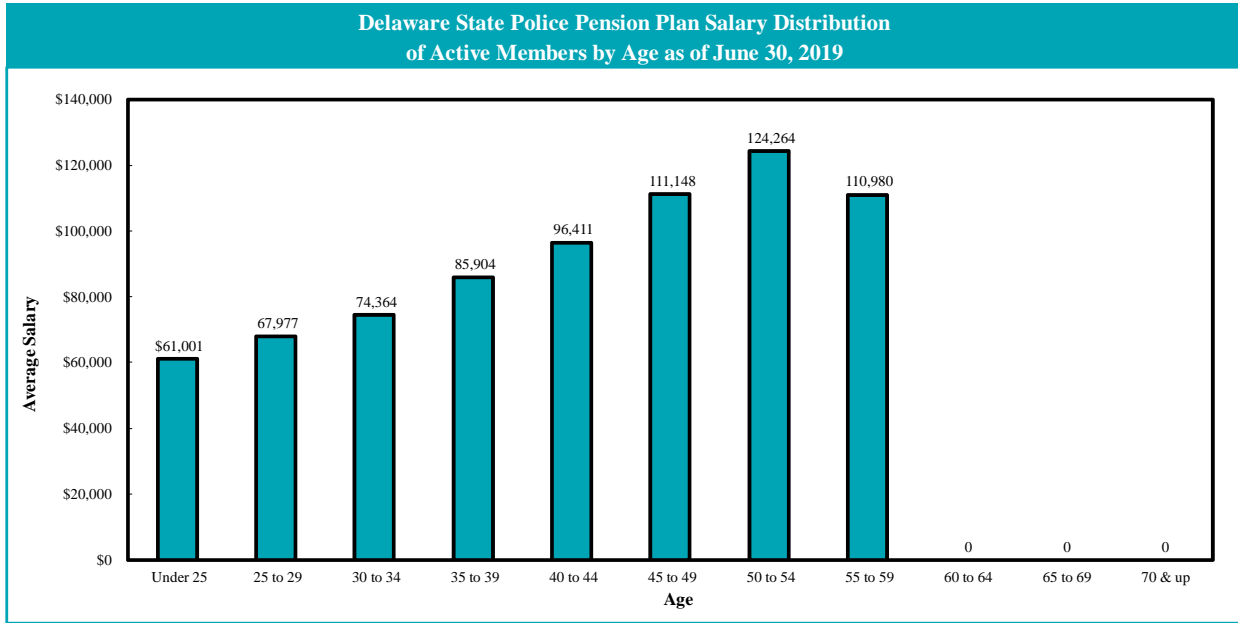
**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX A - MEMBERSHIP INFORMATION

Delaware State Police Pension Plan Salary Distribution of Active Members by Age and Service as of June 30, 2019												
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	\$ 53,187	\$ 66,684	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 61,001
25 to 29	54,267	68,794	74,789	0	0	0	0	0	0	0	0	67,977
30 to 34	51,492	69,768	77,397	85,375	0	0	0	0	0	0	0	74,364
35 to 39	0	69,404	76,599	88,010	99,299	0	0	0	0	0	0	85,904
40 to 44	0	70,252	77,414	90,468	103,921	114,511	0	0	0	0	0	96,411
45 to 49	0	0	78,985	90,380	102,346	117,081	129,136	0	0	0	0	111,148
50 to 54	0	0	0	92,987	101,167	117,924	130,878	139,764	0	0	0	124,264
55 to 59	0	0	0	0	104,927	117,032	0	0	0	0	0	110,980
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	\$ 53,332	\$ 68,963	\$ 76,868	\$ 88,714	\$ 102,661	\$ 117,058	\$ 130,581	\$ 139,764	\$ 0	\$ 0	\$ 0	\$ 93,517

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



**DELAWARE STATE POLICE PENSION PLAN
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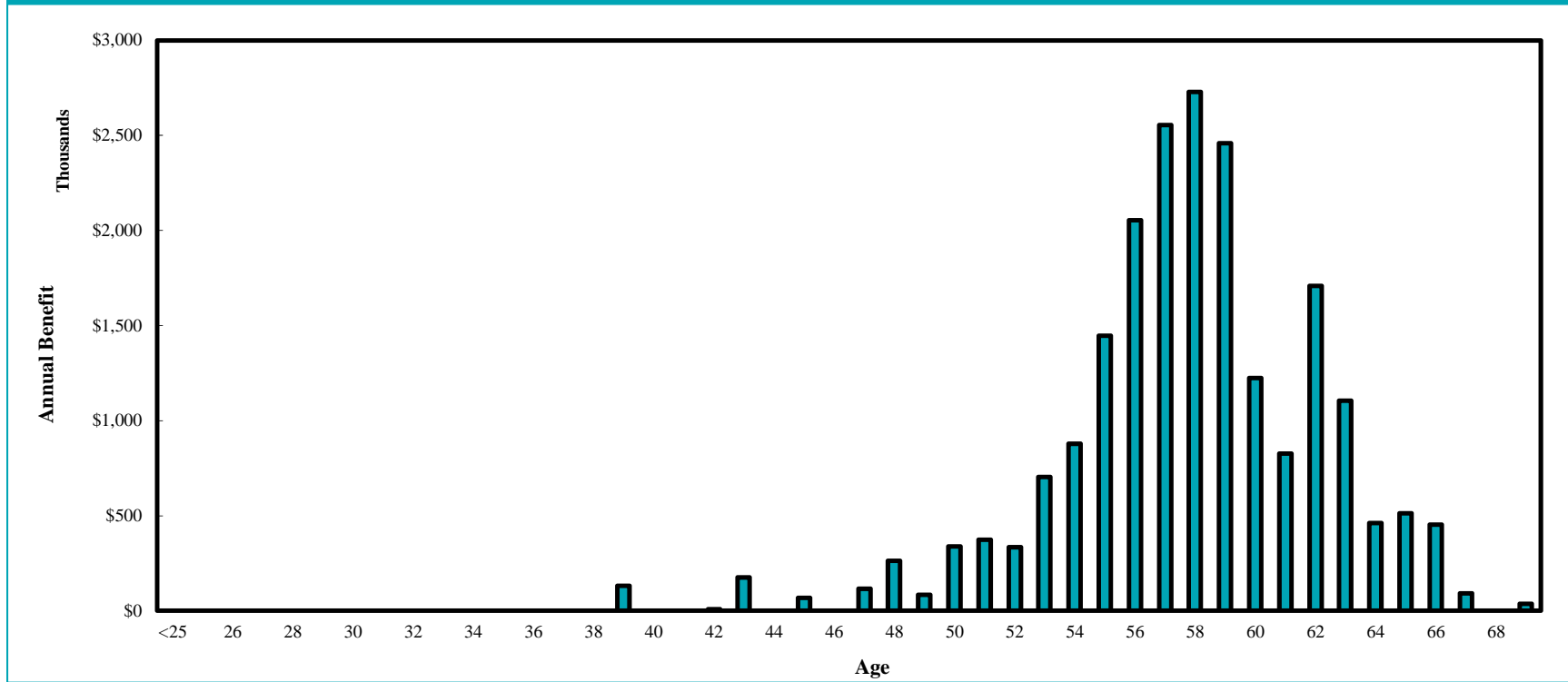
**Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Retired Members, Survivors, and Disabled Members as of June 30,**

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	2	\$130,101	88	0	\$0
40	0	\$0	89	0	\$0
41	0	\$0	90	0	\$0
42	1	\$6,364	91	0	\$0
43	3	\$173,541	92	0	\$0
44	0	\$0	93	0	\$0
45	2	\$66,777	94	0	\$0
46	0	\$0	95	0	\$0
47	2	\$113,646	96	0	\$0
48	5	\$262,238	97	0	\$0
49	2	\$83,175	98	0	\$0
50	6	\$338,228	99	0	\$0
51	7	\$372,232	100	0	\$0
52	5	\$335,822	101	0	\$0
53	10	\$702,516	102	0	\$0
54	13	\$879,844	103	0	\$0
55	17	\$1,445,061	104	0	\$0
56	25	\$2,053,440	105	0	\$0
57	32	\$2,554,826	106	0	\$0
58	39	\$2,729,469	107	0	\$0
59	28	\$2,459,491	108	0	\$0
60	16	\$1,223,546	109	0	\$0
61	18	\$825,579	110	0	\$0
62	22	\$1,708,017	111	0	\$0
63	17	\$1,104,527	112	0	\$0
64	9	\$460,453	113	0	\$0
65	11	\$514,322	114	0	\$0
66	9	\$454,816	115	0	\$0
67	2	\$92,497	116	0	\$0
68	0	\$0	117	0	\$0
69	2	\$37,014	118	0	\$0
70	0	\$0	119	0	\$0
71	0	\$0	120	0	\$0
72	0	\$0			
			Totals	305	\$21,127,542

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, 2019



**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX A - MEMBERSHIP INFORMATION

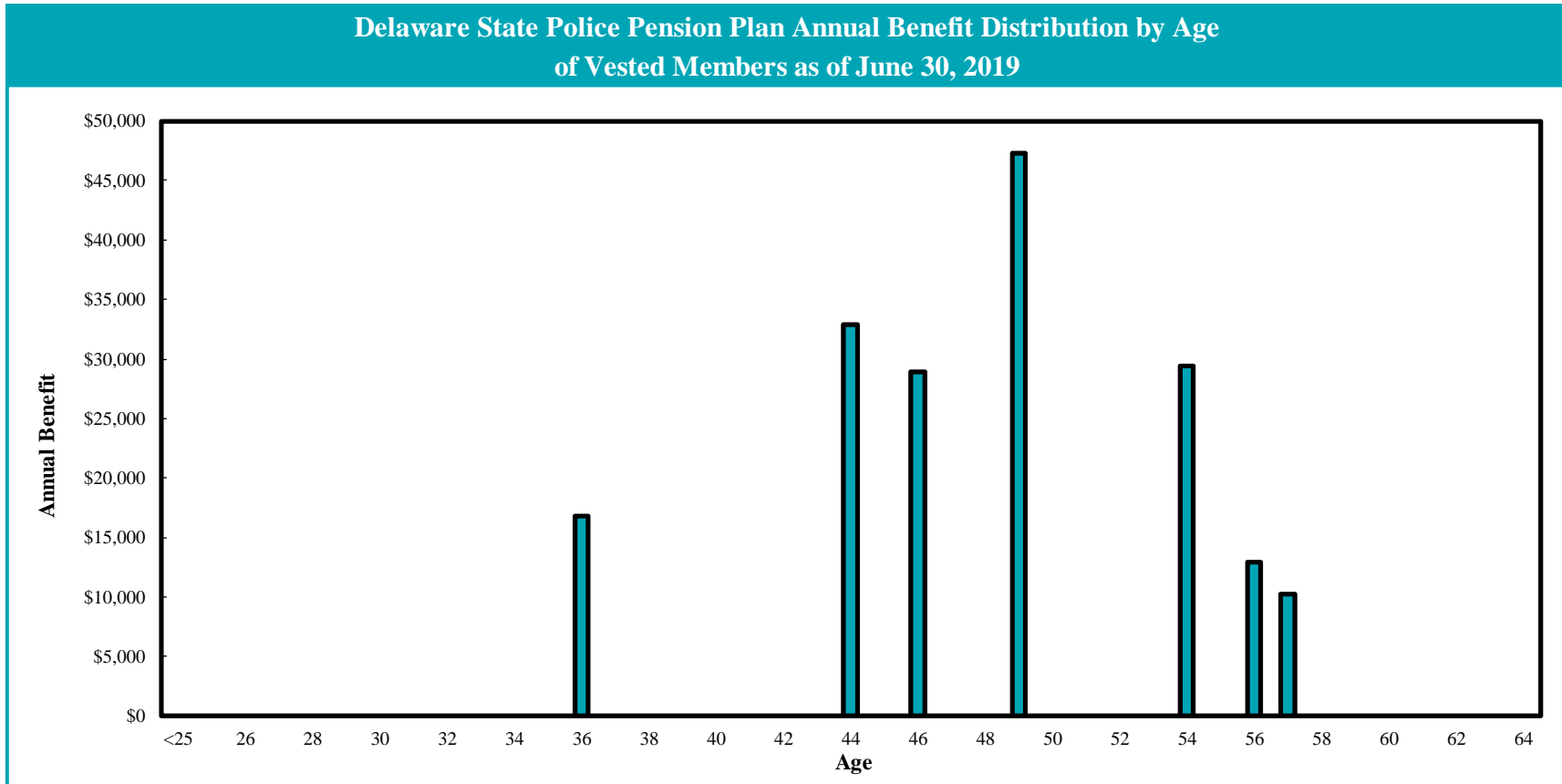
**Delaware State Police Pension Plan Annual Benefit Distribution by Age
of Vested Members as of June 30, 2019**

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	1	\$16,802	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	0	\$0	90	0	\$0
42	0	\$0	91	0	\$0
43	0	\$0	92	0	\$0
44	1	\$32,846	93	0	\$0
45	0	\$0	94	0	\$0
46	1	\$28,869	95	0	\$0
47	0	\$0	96	0	\$0
48	0	\$0	97	0	\$0
49	2	\$47,241	98	0	\$0
50	0	\$0	99	0	\$0
51	0	\$0	100	0	\$0
52	0	\$0	101	0	\$0
53	0	\$0	102	0	\$0
54	3	\$29,369	103	0	\$0
55	0	\$0	104	0	\$0
56	1	\$12,915	105	0	\$0
57	1	\$10,223	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	10	\$178,265

Amounts shown are those payable once the participant reaches retirement eligibility.

DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019

APPENDIX A - MEMBERSHIP INFORMATION



Amounts shown are those payable once the participant reaches retirement eligibility.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

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):

(2019 Values Shown)		
Age	Male	Female
25	5	2
30	5	2
35	5	3
40	6	4
45	10	6
50	18	10
55	29	16
60	49	24
65	87	36
70	149	62
75	253	107
80	428	185

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. Two-thirds of deaths are assumed to be non-duty and one-third assumed duty-related.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

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):**

(2019 Values Shown)		
Age	Male	Female
50	43	26
55	60	35
60	82	51
65	116	79
70	180	126
75	293	207
80	494	350
85	862	623
90	1,530	1,121
95	2,432	1,857
100	3,484	2,783

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.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

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

(2019 Values Shown)		
Age	Male	Female
25	90	27
30	86	34
35	102	48
40	122	65
45	190	102
50	233	135
55	268	170
60	306	202
65	365	245
70	473	333
75	647	488
80	923	737
85	1,375	1,116
90	2,125	1,666
95	3,000	2,438
100	3,955	3,430

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.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

b. Sample 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.
For total disability, one eligible dependent is assumed.

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

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

* Termination rates zero once member has reached retirement eligibility regardless of service.

d. Rates of 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.

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

e. Salary Increase Rates

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. Actual marital characteristics are used for pensioners.

2. Economic Assumptions

- a. Investment Rate of Return: 7.00%
- 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. Technical and Miscellaneous Assumptions

- a. Decrement timing: Middle of year, except at 100% retirement, which is assumed at the beginning of year
- b. Eligibility timing: As of beginning of year
- c. Terminated vested marital status: All terminated vested members are assumed married
- d. Salary adjustment: Salaries for FY 2019 reduced by \$500 to reflect effect of SB 236 for actives who joined the Plan by July 8, 2018

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

APPENDIX B - ACTUARIAL ASSUMPTIONS AND METHODS

4. 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 through June 30, 2015. The Board continually reviews the investment rate of return assumption and adopted a reduced rate of 7.0% at the advice of its investment consultants, first effective for funding with the 2017 valuation.

5. Changes and Rationale Since Last Valuation

None

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 or state reimbursements is amortized over closed periods. The UAL as of July 1, 2018 uses a 20-year period as a level percentage of payroll. UAL layers arising in future valuations will be amortized over their own 15-year periods. 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.

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 and Rationale Since Last Valuation

None

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

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%

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

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

**DELAWARE STATE POLICE PENSION PLAN
ACTUARIAL VALUATION AS OF JUNE 30, 2019**

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: Terminated service

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