



**Cavanaugh Macdonald**  
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***NEBRASKA PUBLIC EMPLOYEES  
RETIREMENT SYSTEM***

**STATE PATROL RETIREMENT SYSTEM**

**ACTUARIAL VALUATION REPORT  
AS OF JULY 1, 2019**

**Sixty-Fourth Actuarial Report for  
System Plan Year Beginning July 1, 2019  
and  
State Fiscal Year Ending June 30, 2021**







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# Cavanaugh Macdonald

CONSULTING, LLC

*The experience and dedication you deserve*

November 13, 2019

Public Employees Retirement Board  
Nebraska Public Employees Retirement System  
Post Office Box 94816  
Lincoln, NE 68509

Dear Members of the Board:

At your request, we performed an actuarial valuation of the State Patrol Retirement System as of July 1, 2019 for purposes of determining the actuarial required contribution rate for the plan year ending June 30, 2020. It is our understanding that any additional required State contributions for this plan year will be made on July 1, 2020 (State fiscal year end 2021). The major findings of the valuation are contained in this report, which reflects the benefit provisions in place on July 1, 2019. There were no changes to the actuarial assumptions and methods or benefit provisions from the prior valuation.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonably consistent and comparable with the information received in prior years. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, rates of interest and other factors for the State Patrol Retirement System have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer the best estimate of anticipated experience affecting the System. Nevertheless, the emerging costs will vary from those presented in this report to the extent actual experience differs from that projected by the actuarial assumptions. The Public Employees Retirement Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix C.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.



Public Employees Retirement Board  
November 13, 2019  
Page 2

The actuarial computations presented in this report are for purposes of determining the funding amounts for the System as set out in the Nebraska state statutes. The calculations in the enclosed report have been made on a basis consistent with our understanding of the System's funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standards No. 67 and No. 68 will be presented in completely separate reports.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in the report, or to provide explanations or further details as may be appropriate.

We respectfully submit the following report and look forward to discussing it with you.

Sincerely,

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice A. Beckham, FSA, EA, FCA, MAAA  
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Brent A. Banister' in a cursive script.

Brent A. Banister Ph.D., FSA, EA, MAAA, FCA  
Chief Actuary



## SECTION 1 – BOARD SUMMARY

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This report presents the results of the July 1, 2019 actuarial valuation of the State Patrol Retirement System (System). The primary purposes of performing this actuarial valuation are to:

- Determine the level of State contributions for the plan year ending June 30, 2020 which are sufficient to meet the funding policy set out in the Nebraska state statutes.
- Disclose asset and liability measurements as well as the current funded status of the System as of the valuation date.
- Assess and disclose the key risks associated with funding the System.
- Compare actual and expected experience under the System during the plan year ended June 30, 2019.
- Analyze and report on trends in System contributions, assets and liabilities over the past several years.

There were no changes to the actuarial assumptions and methods or the benefit provisions from the prior valuation. The actuarial valuation results provide a “snapshot” view of the System’s financial condition on July 1, 2019. The System’s unfunded actuarial accrued liability (UAAL) increased slightly from \$62.5 million last year to \$62.9 million this year and the funded ratio remained at 87%. In addition, the actuarial required contribution rate increased from 45.53% of pay last year to 45.67% of pay in this year’s valuation, an increase of 0.14%.

The Nebraska statutes require the State to make an additional contribution if the regular, payroll-related contributions by members and the State are insufficient to meet the actuarial required contribution for the plan year. **Based on the results of the July 1, 2019 actuarial valuation, an additional State contribution of \$4,112,870 is required for the plan year ending June 30, 2020 (expected to be paid July 1, 2020).** This is an increase from the additional amount in the June 30, 2018 actuarial valuation of \$3,983,698.

The valuation results reflect net unfavorable experience for the past plan year as demonstrated by an UAAL that was higher than expected. The UAAL as of July 1, 2019 is \$62.9 million compared to an expected UAAL of \$62.4 million. The unfavorable experience was due to the net impact of an experience gain on the System liabilities and an experience loss on the actuarial value of assets. The rate of return on the market value of assets for FY 2019 was 6.2%, as reported by the Nebraska Investment Council. However, the asset smoothing method only recognizes 20% of the difference between the dollar amount of the assumed return and the actual return. The partial recognition of FY 2019 experience, coupled with the scheduled recognition of the deferred investment experience from the prior four years, resulted in a rate of return on the actuarial (smoothed) value of assets of 6.7%. Because this return is lower than the assumed rate of return (7.5%), it generated an experience loss of \$3.4 million on the actuarial value of assets. There was also a net experience gain of \$2.9 million on the System’s liabilities, largely due to salary and cost-of-living increases that were lower than expected, based on the actuarial assumptions.

The 2016 Legislature made changes to the benefit structure for members hired on or after July 1, 2016 (Tier 2) which included final average compensation moving from the average of the three highest 12-month periods to the average of the five highest 12-month periods, the maximum cost-of-living adjustment changing from 2.50% to 1.00%, and the contribution rate changing from 16.00% to 17.00%. In addition, Tier 2 members are not eligible to participate in DROP. As a result of the change in the contribution rate for Tier 2 members, statutory contribution rates are expressed as a weighted average of the Tier 1 and Tier



## SECTION 1 – BOARD SUMMARY

2 contribution rates throughout this report. The weighted statutory employee and employer contribution rate in the current valuation is 16.11%, slightly above the Tier 1 contribution rate of 16.00%. This is due to the fact that there are only 51 members in Tier 2 as of July 1, 2019, which is about 13% of the active membership. While the weighted contribution rate will continue to increase gradually as more of the active members are in Tier 2, it will be a number of years before Tier 2 has a meaningful impact on the System's liabilities and overall valuation results.

A summary of the key results from the July 1, 2019 actuarial valuation is shown in the following table. As the table indicates, the statutory contribution rates are not sufficient to meet the actuarial required contribution rate and an additional State appropriation of 13.45% of pay, or \$4,112,870, is required. Further detail on the valuation results can be found in the following sections of this Board Summary.

	Valuation Results	
	July 1, 2019	July 1, 2018
Unfunded Actuarial Accrued Liability	\$62,863,765	\$62,504,026
Funded Ratio (Actuarial Assets)	87.34%	86.98%
Normal Cost Rate	30.38%	30.43%
UAAL Amortization Rate	15.29%	15.10%
Total Actuarial Required Contribution	45.67%	45.53%
Weighted Member Contribution Rate	(16.11%)	(16.08%)
Weighted Employer Contribution Rate	(16.11%)	(16.08%)
Additional Required State Contribution Rate	13.45%	13.37%
Additional Required State Contribution	\$4,112,870	\$3,983,698

### ***EXPERIENCE FOR THE LAST PLAN YEAR***

Numerous factors contributed to the change in the System's assets, liabilities, and actuarial required contribution rate between July 1, 2018 and July 1, 2019. The components of the System's experience are examined in the following discussion.

### **MEMBERSHIP**

When the number of active members increases, it has a positive impact on the System's funding as the amount of statutory fixed contributions are higher, reducing the additional contribution needed from the State. There were 397 active members (excluding DROP members) in the 2019 valuation compared to 395 in the 2018 valuation, a 0.5% increase. This small increase of two active members did not have a material impact on the current valuation results. However, the UAAL is amortized assuming future covered payroll will increase 3.50% per year so the dollar amount of UAAL payments increases 3.50% each year. If total payroll grows more than 3.50%, the UAAL payment is divided by payroll that is larger than expected, which results in a lower UAAL amortization rate. Conversely, a decrease in active members, or payroll growth less than 3.50% per year, will tend to result in a higher amortization rate. The 2019 valuation reflects an increase of only 2.6% in covered payroll which creates a higher UAAL contribution rate, all other things being equal.

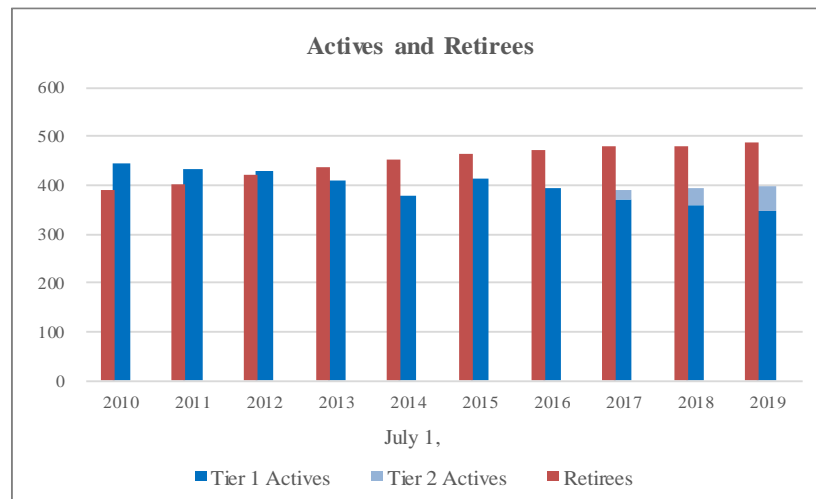




## SECTION 1 – BOARD SUMMARY

The graph below compares the number of active and retired members for the past ten valuations. While the number of active members has fluctuated at times over this period, the number of members receiving a benefit has steadily increased, reaching 488 in this valuation. This is a standard indication of the maturity of the system and is not necessarily unexpected. However, this metric does indicate there may be a higher degree of contribution rate volatility when actual experience varies from that expected by the assumptions.

The following graph shows the number of active members compared to the number of members receiving a benefit.



## ASSETS

As of June 30, 2019, the System had net assets of \$436.6 million, when measured on a market value basis, an increase of \$15.9 million from the prior year.

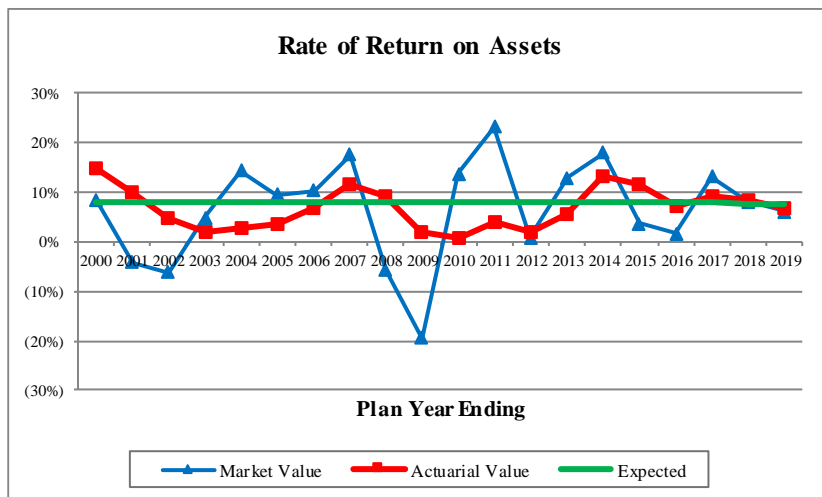
The market value of assets is not used directly in the calculation of the unfunded actuarial accrued liability and the actuarial required contribution rate. An asset valuation method, which smoothes the effect of market fluctuations, is applied to determine the value of assets used in the valuation. The resulting amount is called the actuarial value of assets. In this year's valuation, the actuarial value of assets is \$433.7 million, an increase of \$16.1 million from the prior year. The components of change in the asset values are shown in the following table:

	Market Value (\$M)	Actuarial Value (\$M)
<b>Net Assets, June 30, 2018</b>	\$ 420.7	\$ 417.6
- Employer and Member Contributions	+ 13.4	+ 13.4
- Benefit Payments	- 25.0	- 25.0
- Net Investment Income	+ 27.5	+ 27.7
<b>Net Assets, June 30, 2019</b>	\$ 436.6	\$ 433.7
Estimated Rate of Return	6.2%	6.7%



**SECTION 1 – BOARD SUMMARY**

The rate of return on the market value of assets was 6.2%. The return on the actuarial value of assets was 6.7%, which was lower than the 7.5% investment return assumption. As a result, there was an actuarial experience loss on assets of \$3.4 million. The combined impact of the unfavorable investment experience for FY 2019 and the scheduled recognition of deferred investment gains and losses resulted a small decrease in the deferred investment experience from a net deferred investment gain of \$3.1 million in last year’s valuation to a net deferred investment gain of \$2.9 million in the current valuation. Please see Section 3 of this report for more detailed information on the market and actuarial value of assets.



*The rate of return of the actuarial value of assets has been less volatile than the market value return, illustrating the benefit of using an asset smoothing method.*

**LIABILITIES**

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs, i.e. the portion allocated to past years of service. The difference between this liability and the actuarial value of assets as of the valuation date is called the unfunded actuarial accrued liability (UAAL). The dollar amount of unfunded actuarial accrued liability is reduced if the contributions to the System exceed the normal cost for the year plus interest on the prior year’s UAAL.

The unfunded actuarial accrued liability as of July 1, 2019, using both the actuarial and market value of assets, is shown in the following table:

	Actuarial Value of Assets	Market Value of Assets
Actuarial Accrued Liability	\$496,519,265	\$496,519,265
Value of Assets	<u>433,655,500</u>	<u>436,611,997</u>
Unfunded Actuarial Accrued Liability	\$62,863,765	\$59,907,268
Funded Ratio	87.34%	87.93%

Absent investment returns lower than expected (7.5%), the funded ratio is expected to increase slightly over the next four years as the deferred investment experience is recognized. See Section 4 of the report for the detailed development of the unfunded actuarial accrued liability.



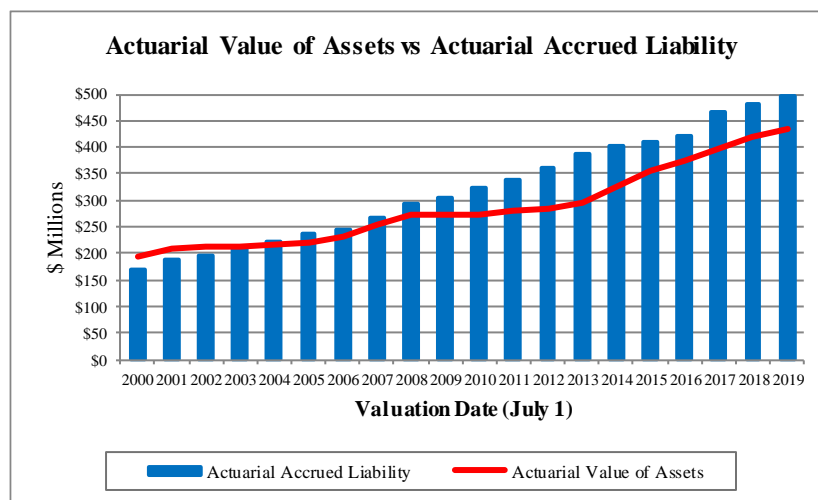
**SECTION 1 – BOARD SUMMARY**

The components of the net increase of \$0.4 million in the UAAL from July 1, 2018 to July 1, 2019 is shown in the following table:

	(\$ Millions)
<b>Unfunded Actuarial Accrued Liability, July 1, 2018</b>	<b>\$62.50</b>
- Expected increase from amortization method	0.02
- Investment experience	3.35
- Liability experience	(2.86)
- Other experience	(0.15)
<b>Unfunded Actuarial Accrued Liability, July 1, 2019</b>	<b>\$62.86</b>

As shown above, various components impacted the UAAL. Actuarial experience gains (losses), which result from actual experience that is more (less) favorable than anticipated by the actuarial assumptions, are reflected in the UAAL and are measured as the difference between the expected UAAL and the actual UAAL, taking into account any changes due to actuarial assumptions and methods or benefit provisions. Overall, the System experienced a net actuarial experience loss of \$0.5 million which may be explained by considering the separate experience of assets and liabilities. As noted earlier, there was an actuarial experience loss of \$3.4 million on the actuarial value of assets. Favorable experience on System liabilities resulted in a net actuarial experience gain of \$2.9 million, largely due to actual salary increases that were lower than expected and a cost-of-living increase that was lower than the assumed increase (1.44% versus 2.50%). A breakdown of the components of the actuarial experience gains and losses can be found in Table 8 of this report.

As the following graph of historical actuarial assets and actuarial accrued liabilities shows, the System’s liabilities grew at a faster pace than the System’s assets for the five-year period beginning after the FY 2009 market downturn. As a result, the funded ratio declined over that period. Since 2013, the System’s funded ratio has generally been improving. However, changes to the actuarial assumptions in the July 1, 2017 valuation increased the System’s liabilities and lowered the funded ratio.





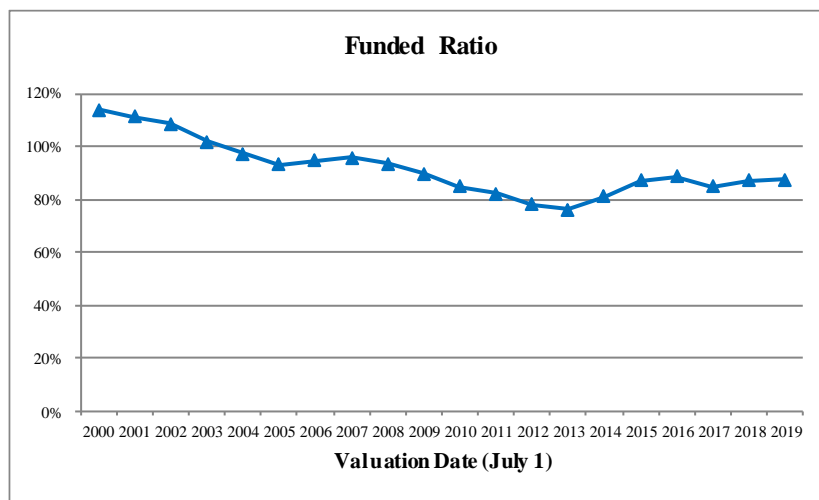
## SECTION 1 – BOARD SUMMARY

An evaluation of the UAAL on a pure dollar basis may not provide a complete analysis since only the difference between the assets and liabilities (which are both very large numbers) is reflected. Another way to evaluate the UAAL and the progress made in its funding is to track the funded ratio, the ratio of the actuarial value of assets to the actuarial accrued liability. The funded status information, which is based on the actuarial value of assets, is shown below (in millions).

	7/1/2015	7/1/2016	7/1/2017	7/1/2018	7/1/2019
Funded Ratio (AVA/AAL)	86.89%	88.69%	84.97%	86.98%	87.34%
UAAL	\$53.76	\$47.72	\$69.92	\$62.50	\$62.86

Note that the funded ratio does not indicate whether or not the System assets are sufficient to settle benefits earned to date. The funded ratio, by itself, also may not be indicative of future funding requirements. In addition, if the funded ratios were shown using the market value of assets, the results would differ.

The funded ratio over a longer period is shown in the following graph. Given the weighted statutory contribution rate of 32.22% of pay (16.11% by members and 16.11% by the employer) and a normal cost rate of 30.38% of pay, only a small portion of the total contribution is available to fund the UAAL. As a result, additional contributions from the State will be necessary to improve the funded ratio absent actual investment experience in future years that is higher than the assumed rate of return.



### ACTUARIAL REQUIRED CONTRIBUTION RATE

The System is funded by statutory contribution rates of 16.00% of pay for Tier 1 members, 17.00% of pay for Tier 2 members, and matching contributions paid by the employer. State statutes require the State of Nebraska to make an additional contribution if the regular, payroll-related contributions by employees and employers are insufficient to meet the actuarial required contribution rate for the plan year. The additional State contribution for each plan year is made on the July 1 following the plan year-end. **Based on the results of the July 1, 2019 actuarial valuation, an additional State contribution of 13.45% of pay, or \$4,112,870, is necessary for the plan year ending June 30, 2020.**



## SECTION 1 – BOARD SUMMARY

Under the Entry Age Normal cost method, the actuarial required contribution rate consists of two components:

- A “normal cost” for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date.
- An “unfunded actuarial accrued liability contribution” for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

The UAAL contribution rate is determined by calculating the amortization payments as a level-percent of payroll. This methodology results in dollar amounts of payments that are lower in the initial years of the amortization period, but increase each year in the future with the assumed payroll growth assumption (3.50%). Because the UAAL contribution rate is determined as a level-percent of payroll, the dollar amount of the UAAL contribution is scheduled to increase 3.50% each year in the future, even if all actuarial assumptions are met. Therefore, if the increase in covered payroll is less than 3.50% per year, the UAAL contribution rate will increase. The increase in covered payroll from the 2018 valuation was 2.6% compared to the 3.5% assumed increase, resulting in a higher UAAL contribution rate.

See Section 5 of the report for the detailed development of the actuarial contribution rate and the corresponding dollar amount, which are summarized in the following table.

Contribution Rates	July 1, 2019	July 1, 2018
1. Normal Cost Rate	30.38%	30.43%
2. UAAL Contribution Rate	15.29%	15.10%
3. Total Actuarial Required Contribution Rate	45.67%	45.53%
4. Weighted Member Contribution Rate	(16.11%)	(16.08%)
5. Weighted Employer Contribution Rate	(16.11%)	(16.08%)
6. Total Statutory Contribution Rate	(32.22%)	(32.16%)
7. Additional Required State Contribution Rate [3 + 6]	13.45%	13.37%
8. Estimated Payroll	\$ 30,578,962	\$ 29,795,799
9. Additional State Required Contribution [7 * 8, but not less than \$0]	\$ 4,112,870	\$ 3,983,698

The actuarial required contribution rate for the plan year ending June 30, 2020 is 45.67%. The weighted contribution rate of 16.11% for the member and employer results in a total payroll-related statutory contribution rate of 32.22% of pay. As a result, there is a contribution shortfall this year of 13.45% of payroll, which is projected to be about \$4.1 million. The actuarial required contribution, determined this year, based on the snapshot of the System taken on the valuation date of July 1, 2019, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System. Therefore, it is expected to change each year. To the extent the difference between the actual and expected experience is significant, the change in the actuarial contribution rate is also expected to change significantly. This volatility in the actuarial contribution rate results in potentially extreme volatility in the additional State contribution as it is the difference between the actuarial



## SECTION 1 – BOARD SUMMARY

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contribution rate and the statutory contribution rates. Any material difference in the actuarial contribution rate will flow through to the additional State contribution.

The primary components of the change in the actuarial required contribution rate are shown in the following table.

<b>Total Actuarial Required Contribution Rate, July 1, 2018</b>	45.53%
- Change in normal cost rate	(0.05%)
- Contributions above the Actuarial Required Contribution	(0.03%)
- Investment experience	0.62%
- Liability experience	(0.53%)
- Payroll increase less than expected	0.13%
- Other experience	<u>0.00%</u>
<b>Total Actuarial Required Contribution Rate, July 1, 2019</b>	45.67%

A history of actuarial required contribution rates and any resulting additional required State contributions, whether or not actually contributed, as shown in the actuarial valuation is shown in the following table.



**SECTION 1 – BOARD SUMMARY**

<b>History of Expected State Contributions</b>			
<b>Plan Year</b>	<b>Statutory State Contributions</b>	<b>Additional Appropriations</b>	<b>Total</b>
2019/2020	\$ 4,926,271	\$ 4,112,870	\$ 9,039,141
2018/2019	4,791,164	3,983,698	8,774,862
2017/2018	4,592,242	4,337,435	8,929,677
2016/2017	4,449,116	2,541,558	6,990,674
2015/2016	4,547,633	2,725,738	7,273,371
2014/2015	4,149,416	3,866,737	8,016,153
2013/2014	4,386,823	4,652,774	9,039,597
2012/2013	5,005,482	4,552,680	9,558,162
2011/2012	5,291,940	2,255,430	7,547,370
2010/2011	4,597,331	2,770,262	7,367,593
2009/2010	4,203,166	1,801,610	6,004,776
2008/2009	4,361,746	812,087	5,173,833
2007/2008	4,225,729	365,020	4,590,749
2006/2007	3,942,430	813,159	4,755,589
2005/2006	3,766,098	1,080,050	4,846,148
2004/2005	3,050,645	948,654	3,999,299
2003/2004	2,745,970	434,202	3,180,172
2002/2003	2,413,762	0	2,413,762

Note: Information before Plan Year 2013/2014 was produced by prior actuary.

The actuarial required contribution rate, which for this plan year is determined based on the snapshot of the System taken on the valuation date of July 1, 2019, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System.

**RISK ASSESSMENT AND DISCLOSURE**

A typical retirement plan faces many different risks. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world risk can be translated as uncertainty. Actuarial Standard of Practice Number 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. Risk evaluation is an important part of managing a defined benefit plan. Please see Section 6 of this report for an in-depth discussion of the specific risks facing the Nebraska State Patrol Retirement System.

**SECTION 1 – BOARD SUMMARY****SUMMARY OF PRINCIPAL RESULTS**

	<u>7/1/2019 Valuation</u>	<u>7/1/2018 Valuation</u>	<u>% Change</u>
<b>1. PARTICIPANT DATA</b>			
Number of:			
Active Members			
- Tier 1	346	357	(3.1%)
- Tier 2	51	38	34.2%
- Total	<u>397</u>	<u>395</u>	0.5%
Retired Members and Beneficiaries	448	431	3.9%
DROP Participants	25	33	(24.2%)
Disabled Members	15	14	7.1%
Inactive Members	30	36	(16.7%)
Total Members	<u>915</u>	<u>909</u>	0.7%
Projected Annual Salaries of Active Members	\$ 30,578,962	\$ 29,795,799	2.6%
Annual Retirement Payments for Members in Receipt and DROP Participants	\$ 23,533,240	\$ 22,642,266	3.9%
<b>2. ASSETS AND LIABILITIES</b>			
a. Market Value of Assets	\$ 436,611,997	\$ 420,683,030	3.8%
b. Actuarial Value of Assets	433,655,500	417,588,175	3.8%
c. Total Actuarial Accrued Liability	496,519,265	480,092,201	3.4%
d. Unfunded Actuarial Accrued Liability [c - b]	\$ 62,863,765	\$ 62,504,026	0.6%
e. Funded Ratio (Actuarial Value of Assets) [b / c]	87.34%	86.98%	0.4%
f. Funded Ratio (Market Value of Assets) [a / c]	87.93%	87.63%	0.3%
<b>3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL</b>			
Normal Cost	30.38%	30.43%	(0.2%)
Amortization of Unfunded Actuarial Accrued Liability	15.29%	15.10%	1.3%
Actuarial Required Contribution Rate	<u>45.67%</u>	<u>45.53%</u>	0.3%
Weighted Member Contribution Rate	(16.11%)	(16.08%)	0.2%
Weighted Employer Contribution Rate	<u>(16.11%)</u>	<u>(16.08%)</u>	0.2%
Additional Required State Contribution Rate	13.45%	13.37%	0.6%
Additional Required State Contribution	\$ 4,112,870	\$ 3,983,698	3.2%





## SECTION 2 – SCOPE OF THE REPORT

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This report presents the actuarial valuation of the State Patrol Retirement System as of July 1, 2019. This valuation was prepared at the request of the Public Employees Retirement Board of the Nebraska Public Employees Retirement System.

Please pay particular attention to our actuarial certification letter, where the guidelines employed in the preparation of this report are outlined. We also comment on the sources and reliability of both the data and the actuarial assumptions upon which our findings are based. Those comments are the basis for our certification that this report is complete and accurate to the best of our knowledge and belief.

A summary of the findings which result from this valuation is presented in the previous section. Section 3 describes the assets and investment experience of the System. Sections 4 and 5 describe how the obligations of the System are to be met under the actuarial cost method in use. Section 6 includes risk considerations related to the Nebraska State Patrol Retirement System. Section 7 includes some historical funding and other information.

This report includes several appendices:

- Appendix A Schedules of valuation data classified by various categories of members.
- Appendix B A summary of the current benefit structure, as determined by the provisions of governing law on July 1, 2019.
- Appendix C A summary of the actuarial methods and assumptions used to estimate liabilities and determine contribution rates.
- Appendix D A glossary of actuarial terms.



## SECTION 3 – ASSETS

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In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is July 1, 2019. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of assets. The actuarial process then leads to a method of determining the contributions needed by members and the employer in the future to balance the System's assets and liabilities.

### **Market Value of Assets**

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, the market value of assets provides a basis for measuring investment performance from time to time. Table 1 is a comparison, at market values, of System assets as of July 1, 2019 and July 1, 2018, in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2018 to July 1, 2019.

### **Actuarial Value of Assets**

Due to extreme volatility, the market value of assets, representing a "cash-out" value of System assets on a single day, may be the best measure of the System's ongoing ability to meet its obligations. To arrive at a suitable value of assets for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens swings in the market value while still indirectly recognizing market values. Under the asset smoothing methodology, the difference between the dollar amount of the actual and expected investment return on the market value of assets is recognized evenly over a five-year period.

Table 3 shows the development of the actuarial value of assets (AVA) as of the valuation date.



**TABLE 1**  
**STATE PATROL RETIREMENT SYSTEM**  
**MARKET VALUE OF ASSETS**  
**by Investment Category**

	<u>June 30, 2019</u>	<u>June 30, 2018</u>
1. Cash and Equivalents	\$ 179,903	\$ 191,614
2. Investments*	442,651,810	428,634,410
3. Capital Assets	106	57
4. Receivables and Prepaids	57,991,967	41,983,291
5. Accounts Payable	<u>(64,211,789)</u>	<u>(50,126,342)</u>
6. Net Assets Available for Pension Benefits	\$ 436,611,997	\$ 420,683,030

\* Includes DROP account balances.



**TABLE 2**  
**STATE PATROL RETIREMENT SYSTEM**  
**CHANGE IN MARKET VALUE OF ASSETS**

	2019	2018
1. Market Value of Assets, Beginning of Year	\$ 420,683,030	\$ 397,137,172
2. Contributions		
(a) Member (includes purchased service)	\$ 4,710,105	\$ 4,615,214
(b) State	4,710,107	4,615,214
(c) State appropriations	3,983,698	4,337,435
(d) Total	\$ 13,403,910	\$ 13,567,863
3. Expenditures		
(a) Benefit payments	\$ 21,185,702	\$ 19,807,411
(b) Refunds	172,043	288,116
(c) DROP Disbursements	3,596,031	3,733,153
(d) Administrative expenses	75,872	89,102
(e) Total	\$ 25,029,648	\$ 23,917,782
4. Investment Return, Net of Investment Expenses		
(a) Investment income	\$ 8,293,085	\$ 6,677,908
(b) Securities lending income	231,339	160,575
(c) Securities lending expense	(183,201)	(110,196)
(d) Net appreciation/(depreciation) in fair value of investments	19,195,552	27,144,306
(e) Other	17,930	23,184
(f) Net investment return	\$ 27,554,705	\$ 33,895,777
5. Market Value of Assets, End of Year [1 + 2(d) - 3(e) + 4(f)]	\$ 436,611,997	\$ 420,683,030
6. Rate of Return, Net of Expenses*	6.2%	8.2%

\*Annual money-weighted rate of return, net of investment expense, as reported by the Nebraska Investment Council



**TABLE 3**  
**STATE PATROL RETIREMENT SYSTEM**  
**DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS**

	Year End			
	6/30/2016	6/30/2017	6/30/2018	6/30/2019
1. Actuarial Value of Assets, Beginning of Year	\$ 356,446,470	\$ 374,205,616	\$ 395,149,596	\$ 417,588,175
2. Unrecognized Return Beginning of Year	7,476,161	(13,050,130)	1,987,576	3,094,855
3. Contributions During Year				
(a) Member	\$ 4,365,651	\$ 4,500,952	\$ 4,615,214	\$ 4,710,105
(b) State	4,327,670	4,511,552	4,615,214	4,710,107
(c) State appropriations	2,725,738	2,541,558	4,337,435	3,983,698
(d) Total	\$ 11,419,059	\$ 11,554,062	\$ 13,567,863	\$ 13,403,910
4. Benefit Payments	17,752,098	18,481,633	19,807,411	21,185,702
5. Refund of Contributions/DROP disbursements	1,824,278	5,657,971	4,021,269	3,768,074
6. Expected Investment Income on (1), (2), (3), (4) and (5)*	28,858,929	28,479,019	29,481,800	31,203,784
7. Actual Return on Market Value Net of All Expenses	5,390,172	48,567,228	33,806,675	27,478,833
8. Return to be Spread, End of Year	\$ (23,468,757)	\$ 20,088,209	\$ 4,324,875	\$ (3,724,951)
[7 - 6]				

\* Based on the investment return assumption applicable at the beginning of the year. The assumption was 8.0% through year end 6/30/2017 and 7.5% thereafter.



TABLE 3  
(continued)

STATE PATROL RETIREMENT SYSTEM  
AS OF JULY 1, 2019

9. Return to be Spread

Plan Year	Return to be	Unrecognized	Unrecognized
<u>Ending</u>	<u>Spread</u>	<u>Percent</u>	<u>Return</u>
2019	(\$3,724,951)	80%	(\$2,979,961)
2018	4,324,875	60%	2,594,925
2017	20,088,209	40%	8,035,284
2016	(23,468,757)	20%	(4,693,751)
			<u>\$2,956,497</u>

10. Total Market Value of Assets as of July 1, 2019 \$436,611,997

11. Total Actuarial Value of Assets as of July 1, 2019 \$433,655,500  
[10 - 9]

12. Asset Ratios

(a) Actuarial Value to Market Value [11 / 10]	99.32%
(b) Market Value to Actuarial Value [10 / 11]	100.68%



## SECTION 4 – SYSTEM LIABILITIES

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In the previous section, an actuarial valuation was compared with an inventory process, and an analysis was given of the inventory of assets of the State Patrol Retirement System as of the valuation date, July 1, 2019. In this section, the discussion will focus on the commitments (future benefit payments) of the System, which are referred to as its liabilities.

Table 4 contains an analysis of the actuarial present value of all future benefits (PVFB) for contributing active members, inactive members, retirees and their beneficiaries.

The liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes the measurement of both benefits already earned and future benefits to be earned. For all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and for the lives of the surviving beneficiaries.

All liabilities reflect the benefit provisions in place as of July 1, 2019.

### **Actuarial Accrued Liability**

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to "breakdown" the present value of future benefits into two components:

- (1) that which is attributable to the past and
- (2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the "past service liability" or the "actuarial accrued liability." The portion allocated to the future is known as the present value of future normal costs, with the specific piece of it allocated to the current year being called the "normal cost." Table 5 contains the calculation of actuarial accrued liability for the System. The Entry Age Normal actuarial cost method is used to develop the actuarial accrued liability.



**TABLE 4**  
**STATE PATROL RETIREMENT SYSTEM**  
**PRESENT VALUE OF FUTURE BENEFITS (PVFB)**  
**AS OF JULY 1, 2019**

1. Active Employees	
(a) Retirement	\$ 233,290,441
(b) Termination	3,200,702
(c) Disability	7,225,229
(d) Death	1,125,710
(e) Total	\$ <u>244,842,082</u>
2. Inactive Vested Members	5,183,482
3. Inactive Nonvested Members	175,070
4. DROP Account Balances	4,444,988
5. Disabled Members	6,876,243
6. Retirees	279,393,579
7. Beneficiaries	<u>24,748,670</u>
8. Total Present Value of Future Benefits	\$ 565,664,114





**TABLE 5**  
**STATE PATROL RETIREMENT SYSTEM**  
**ACTUARIAL ACCRUED LIABILITY**  
**AS OF JULY 1, 2019**

1. Present Value of Future Benefits for Active Members	\$	244,842,082
2. Present Value of Future Normal Costs for Active Members		
(a) Retirement	\$	60,047,217
(b) Termination		4,196,781
(c) Disability		4,140,681
(d) Death		760,170
(e) Total	\$	69,144,849
3. Actuarial Accrued Liability for Active Members [1 - 2(e)]	\$	175,697,233
4. Actuarial Accrued Liability for Inactive Members	\$	320,822,032
5. Total Actuarial Accrued Liability [3 + 4]	\$	496,519,265
6. Actuarial Value of Assets	\$	433,655,500
7. Unfunded Actuarial Accrued Liability [5 - 6]	\$	62,863,765
8. Funded Ratio [6 / 5]		87.34%



**TABLE 6**  
**STATE PATROL RETIREMENT SYSTEM**  
**ACTUARIAL BALANCE SHEET**  
**AS OF JULY 1, 2019**

ASSETS

Actuarial Value of Assets	\$ 433,655,500
Unfunded Actuarial Accrued Liability	62,863,765
Present Value of Future Normal Costs	<u>69,144,849</u>
Total Assets	\$ 565,664,114

LIABILITIES

Present Value of Future Benefits		
Active members		
Retirement	\$ 233,290,441	
Termination	3,200,702	
Disability	7,225,229	
Death	<u>1,125,710</u>	
Total		244,842,082
Inactive members		5,358,552
Retirees, disabilities and beneficiaries*		<u>315,463,480</u>
Total		\$ 565,664,114

\* Includes DROP account balances.



TABLE 7  
STATE PATROL RETIREMENT SYSTEM  
ACTUARIAL GAIN/(LOSS)

**Liabilities**

1. Actuarial Accrued Liability as of July 1, 2018	\$ 480,092,201
2. Normal Cost for Plan Year Ending June 30, 2019	8,445,896
3. Benefit Payments During Plan Year Ending June 30, 2019	(24,953,776)
4. Interest at 7.50%	<u>35,799,354</u>
5. Expected Actuarial Accrued Liability as of July 1, 2019	\$ 499,383,675
6. Actuarial Accrued Liability as of July 1, 2019	\$ 496,519,265

**Assets**

7. Actuarial Value of Assets as of July 1, 2018	\$ 417,588,175
8. Contributions During Plan Year Ending June 30, 2019	13,403,910
9. Benefit Payments During Plan Year Ending June 30, 2019	(24,953,776)
10. Interest at 7.50%	<u>30,971,669</u>
11. Expected Actuarial Value of Assets as of July 1, 2019	\$ 437,009,978
12. Actuarial Value of Assets as of July 1, 2019	\$ 433,655,500

**Gain / (Loss)**

13. Actuarial Gain / (Loss) on Liabilities [5 - 6]	\$ 2,864,410
14. Actuarial Gain / (Loss) on Assets [12 - 11]	(3,354,478)
15. Total Actuarial Gain / (Loss) for Plan Year Ending June 30, 2019 [13 + 14]	\$ (490,068)



**TABLE 8**  
**STATE PATROL RETIREMENT SYSTEM**  
**GAIN/(LOSS) ANALYSIS BY SOURCE**

<b>Liability Sources</b>	<b>Gain/(Loss)</b>
Retirement	\$ (460,000)
Termination	(607,000)
Disability	78,000
Mortality	(234,000)
Salary	2,519,000
New Entrants/Rehires	(562,000)
COLA	2,419,000
Miscellaneous	<u>(289,000)</u>
Total Liability Gain/(Loss)	\$ 2,864,000
Asset Gain/(Loss)	\$ (3,354,000)
Net Actuarial Gain/(Loss)	\$ (490,000)



**TABLE 9**  
**STATE PATROL RETIREMENT SYSTEM**  
**PROJECTED BENEFIT PAYMENTS**  
**AS OF JULY 1, 2019**

<u>Plan Year</u> <u>Ending June 30</u>	<u>Current Active</u> <u>Members</u>	<u>Current In-Pay</u> <u>Members</u>	<u>Total</u>
2020	\$ 1,506,000	\$ 23,444,000	\$ 24,950,000
2021	2,583,000	23,722,000	26,305,000
2022	3,694,000	23,999,000	27,693,000
2023	4,498,000	24,312,000	28,810,000
2024	5,851,000	24,578,000	30,429,000
2025	7,851,000	24,833,000	32,684,000
2026	9,563,000	25,173,000	34,736,000
2027	10,967,000	25,395,000	36,362,000
2028	14,200,000	25,604,000	39,804,000
2029	15,478,000	25,856,000	41,334,000
2030	16,679,000	26,015,000	42,694,000
2031	18,207,000	26,191,000	44,398,000
2032	19,161,000	26,246,000	45,407,000
2033	21,112,000	26,342,000	47,454,000
2034	22,357,000	26,319,000	48,676,000
2035	23,360,000	26,288,000	49,648,000
2036	24,506,000	26,177,000	50,683,000
2037	25,285,000	25,999,000	51,284,000
2038	26,629,000	25,764,000	52,393,000
2039	27,339,000	25,471,000	52,810,000
2040	28,857,000	25,118,000	53,975,000
2041	31,144,000	24,706,000	55,850,000
2042	33,589,000	24,231,000	57,820,000
2043	35,161,000	23,694,000	58,855,000
2044	37,132,000	23,095,000	60,227,000
2045	38,556,000	22,431,000	60,987,000
2046	39,969,000	21,703,000	61,672,000
2047	40,856,000	20,913,000	61,769,000
2048	41,539,000	20,064,000	61,603,000
2049	42,231,000	19,160,000	61,391,000

Note: Cash flows are the expected future non-discounted payments to current members. These numbers exclude refund payouts to any current nonvested inactive members and assume future retirees elect the normal form of payment.



## SECTION 5 – EMPLOYER CONTRIBUTIONS

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The previous two sections were devoted to a discussion of the assets and liabilities of the System. A comparison of Tables 3 and 4 indicates that current assets fall short of meeting the present value of future benefits (total liability). This is expected in all but a completely closed fund, where no further contributions are anticipated. In an active system, there will almost always be a difference between the actuarial value of assets and total liabilities. This deficiency has to be made up by future contributions and investment returns. An actuarial valuation sets out a schedule of future contributions that will deal with this deficiency in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between two elements: (1) the normal cost rate and (2) the unfunded actuarial accrued liability contribution rate.

The term "fully funded" is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated by the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. Likewise, when the actuarial value of assets is greater than the actuarial accrued liability, a surplus exists.

### Description of Contribution Rate Components

The Entry Age Normal (EAN) actuarial cost method is used for the valuation. Under that method, the normal cost for each year from entry age to assumed exit age is a constant percentage of the member's year by year projected compensation. The portion of the present value of future benefits not provided by the present value of future normal costs is the actuarial accrued liability. The unfunded actuarial accrued liability/(surplus) represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains and losses.

In general, contributions are computed in accordance with a level-percent-of-payroll funding objective. The actuarial contribution rate, based on the July 1, 2019 actuarial valuation, will be used to determine the actuarial required employer contribution rate to the State Patrol Retirement System for the plan year ending June 30, 2020. Any additional State contributions are expected to be deposited on July 1, 2020 (State fiscal year end 2021). In this context, the term "contribution rate" means the percentage, which is applied to a particular active member payroll to determine the actual employer contribution amount (i.e., in dollars) for the group.

### Contribution Rate Summary

In Table 10 the amortization payment related to the unfunded actuarial accrued liability, as of July 1, 2019, is developed. Table 11 develops the actuarial required contribution rate for the System and the amount of the required state contribution.

The actuarial contribution rates shown in this report are based on the actuarial assumptions and cost methods described in Appendix C.



SECTION 5 – EMPLOYER CONTRIBUTIONS

TABLE 10
STATE PATROL RETIREMENT SYSTEM
AMORTIZATION SCHEDULE FOR THE
UNFUNDED ACTUARIAL ACCRUED LIABILITY

Table with 6 columns: Amortization Bases, Original Amount, July 1, 2019 Remaining Payments, Date of Last Payment, Outstanding Balance as of July 1, 2019, Annual Contribution\*. Rows include UAAL Base (2006-2019) and Experience Base (2013-2019), ending with a Total row.

\* Contribution amount reflects mid-year timing.

- 1. Total UAAL Amortization Payments \$ 4,674,908
2. Projected Payroll for FY 2020 \$ 30,578,962
3. UAAL Amortization Payment Rate 15.29%

Note: Payments on each UAAL base are determined as a level-percent of payroll using a 3.50% payroll growth assumption.



**TABLE 11**

**STATE PATROL RETIREMENT SYSTEM**

**ACTUARIAL REQUIRED CONTRIBUTION**  
**FOR PLAN YEAR ENDING JUNE 30, 2020**  
**and**  
**DEVELOPMENT OF ADDITIONAL STATE CONTRIBUTION**

1. Normal Cost		
(a) Amount	\$	8,335,776
(b) Expected pay for current actives		27,439,071
(c) Normal Cost Rate as % of pay		30.38%
2. UAAL Amortization Rate (see Table 10)		15.29%
3. Total Actuarial Required Contribution Rate [1(c) + 2]		45.67%
4. Weighted Statutory Member Contribution Rate*		16.11%
5. Weighted Statutory Employer Contribution Rate*		16.11%
6. Additional Required State Contribution Rate [3 - 4 - 5, but not less than 0%]		13.45%
7. Projected Payroll for FY 2020	\$	30,578,962
8. Additional Required State Contribution [6 * 7]	\$	4,112,870
9. Total State Contributions		
(a) State statutory amount	\$	4,926,271
(b) Additional State contribution		4,112,870
(c) Total	\$	<u>9,039,141</u>

\*The statutory contribution rate is expressed as the weighted average of the Tier 1 and Tier 2 contribution rates, 16.00% and 17.00%, respectively.





## SECTION 6 – RISK CONSIDERATIONS

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Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September, 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, is first applicable for the July 1, 2019 actuarial valuation for the Nebraska State Patrol Retirement System (System).

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become “pay as you go”. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay; and
- external risks such as the regulatory and political environment.

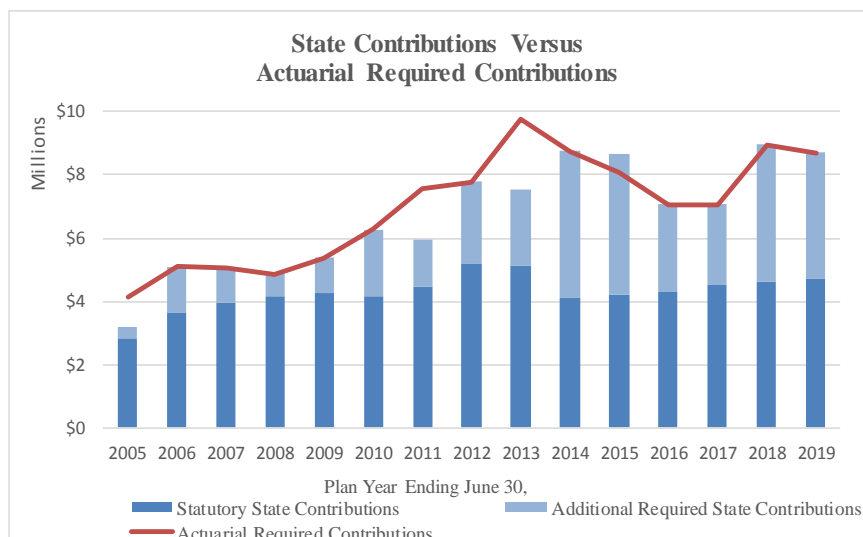
Although the external risks do exist, ASOP 51 does not require the actuary to opine on those risks, so no discussion is included here.

### ***Actual vs Actuarial Contributions***

The System is funded by statutory contribution rates of 16.00% of pay for Tier 1 members and 17.00% of pay for Tier 2 members, and matching contributions paid by the employer. State statutes require the State to make an additional contribution if the regular, payroll-related contributions by employees and the employer are insufficient to meet the actuarial required contribution amount for the plan year. The additional State contribution for each plan year is made on the July 1 following the plan year-end. There is a direct correlation between healthy, well-funded retirement systems and consistent contributions equal to the full actuarial contribution rate each year. As the following graph shows, the State has met the full actuarial required contribution requirement in 12 of the last 15 years.



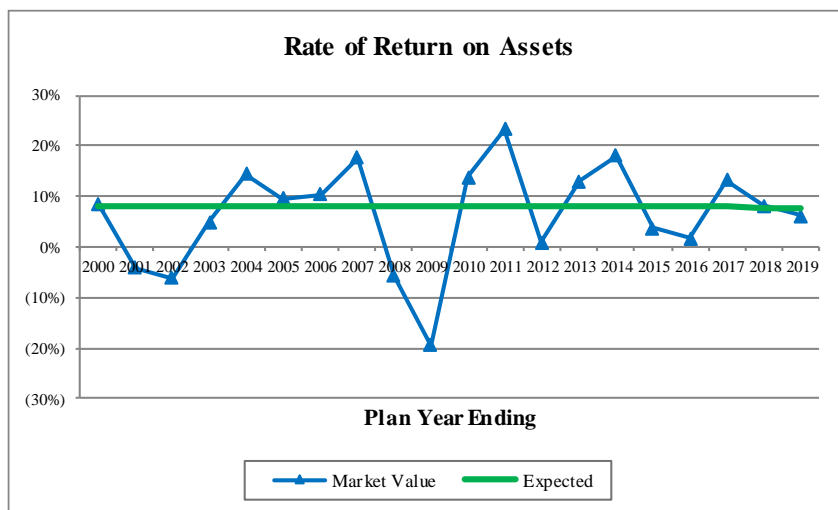
## SECTION 6 – RISK CONSIDERATIONS



One of the positive factors regarding the funding of the State Patrol Retirement System is the State’s commitment to make contributions that are at least equal to the full actuarial required contribution. As a result, the funded ratio for the System has historically been strong.

### ***Investment Return Risk***

The most significant risk factor for most public retirement systems, including the Nebraska State Patrol Retirement System, is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 12). A perusal of historical returns over 10-20 years reveals that the actual return each year is rarely close to the assumed return.



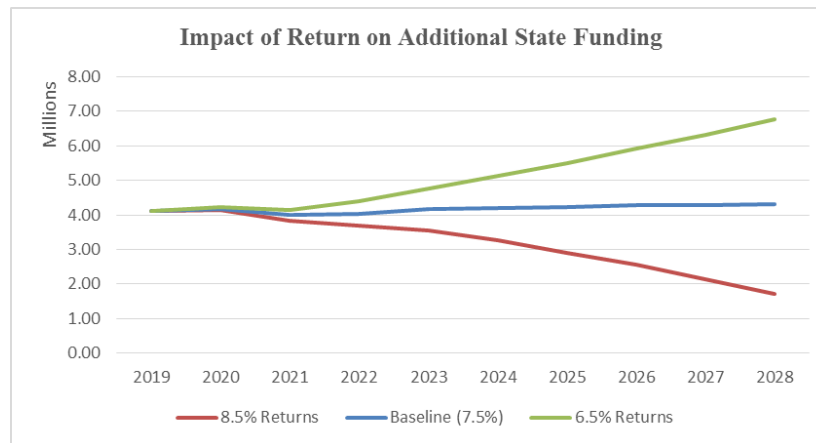
This is not unexpected, given the underlying capital market assumptions and the System’s asset allocation, but it creates significant contribution risk. As Table 12 illustrates, a return that varies from the 7.50% assumption by 10.0% (-2.50% or 17.50%) equates to 140% of payroll. Even with amortizing the actuarial experience loss over 30 years, the impact on the actuarial contribution rate is dramatic (8.11% once the experience is fully recognized).



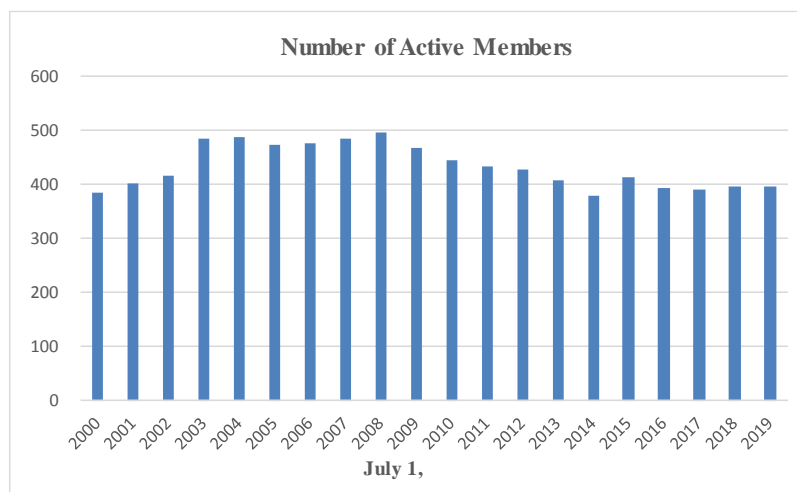
## SECTION 6 – RISK CONSIDERATIONS

### Contribution Risks

The actuarial required contribution, determined this year, based on the snapshot of the System taken on the valuation date of July 1, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System. Therefore, the actuarial contribution rate is expected to change each year. To the extent the difference between the actual and expected experience is significant, the change in the actuarial contribution rate is also expected to change significantly. This volatility in the actuarial contribution rate results in potentially extreme volatility in the additional State contribution (see graph below) due to the fact it is the difference between the actuarial contribution rate and the statutory contribution rates. Any material difference in the actuarial contribution rate will impact the additional State contribution.



Finally, the unfunded actuarial accrued liability is amortized as a level percentage of payroll so the UAAL payment schedule reflects an increasing dollar amount of payments over time, in anticipation of increasing payroll. However, payroll generally does not grow as expected if the number of active members is not stable or increasing. When payroll does not grow as expected, the UAAL contribution rate will be higher than expected even if the dollar amount of the payment is the same as scheduled. The following graph shows the number of active members in the last twenty valuations:





## SECTION 6 – RISK CONSIDERATIONS

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While the valuation process captures differences between actual and expected number of active members (and payroll) each year and adjusts the actuarial contribution rate, a decline in the active member count will create pressure on the contribution rate and push more of the funding of the UAAL to the additional State contribution.

### *Demographic Risks*

A key demographic risk for all retirement systems, including the Nebraska State Patrol Retirement System, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.



TABLE 12

**STATE PATROL RETIREMENT SYSTEM**  
**HISTORICAL ASSET VOLATILITY RATIOS**

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Covered Payroll	Asset Volatility Ratio	Increase in ACR with a Return 10% Lower than Assumed*
July 1, 2000	\$207,164,974	\$15,789,104	13.12	7.45%
July 1, 2001	194,547,235	16,727,477	11.63	6.60%
July 1, 2002	179,067,600	18,846,776	9.50	5.39%
July 1, 2003	183,989,762	21,929,399	8.39	4.76%
July 1, 2004	206,369,362	22,640,907	9.11	5.17%
July 1, 2005	221,307,954	22,882,413	9.67	5.49%
July 1, 2006	241,017,483	24,057,960	10.02	5.69%
July 1, 2007	279,618,100	26,072,859	10.72	6.09%
July 1, 2008	259,479,803	26,979,643	9.62	5.46%
July 1, 2009	205,033,476	25,922,439	7.91	4.49%
July 1, 2010	229,574,640	26,765,816	8.58	4.87%
July 1, 2011	278,146,750	26,195,473	10.62	6.03%
July 1, 2012	278,311,367	25,794,219	10.79	6.13%
July 1, 2013	309,589,784	27,417,644	11.29	6.41%
July 1, 2014	357,316,892	25,933,848	13.78	7.82%
July 1, 2015	363,922,631	28,422,706	12.80	7.27%
July 1, 2016	361,155,486	27,806,977	12.99	7.38%
July 1, 2017	397,137,172	28,629,936	13.87	7.88%
July 1, 2018	420,683,030	29,795,799	14.12	8.02%
July 1, 2019	436,611,997	30,578,962	14.28	8.11%

*Note: Years prior to July 1, 2013 were provided by the prior actuary.*

\*The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). Current year assumptions are used for all years shown.

The assets at July 1, 2019 are 14 times payroll, so underperforming the investment return assumption by 10.00% (i.e., earn -2.50% for one year) creates an actuarial loss of about \$44 million, or 143% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the significant contribution risk associated with volatile investment returns.



**TABLE 13**  
**STATE PATROL RETIREMENT SYSTEM**

**HISTORICAL CASH FLOWS**

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of market value that may cause significant concerns. The System has had negative cash flows of between 1% and 3% over this period.

<b>Year End</b>	<b>Market Value of Assets (MVA)</b>	<b>Contributions</b>	<b>Benefit Payments</b>	<b>Net Cash Flow</b>	<b>Net Cash Flow as a Percent of MVA</b>
6/30/2000	\$207,164,974	\$4,059,423	\$7,078,179	(\$3,018,756)	(1.46%)
6/30/2001	194,547,235	4,252,206	8,212,099	(3,959,893)	(2.04%)
6/30/2002	179,067,600	4,510,950	8,254,812	(3,743,862)	(2.09%)
6/30/2003	183,989,762	4,976,790	8,727,404	(3,750,614)	(2.04%)
6/30/2004	206,369,362	5,479,510	9,155,571	(3,676,061)	(1.78%)
6/30/2005	221,307,954	6,011,266	10,269,807	(4,258,541)	(1.92%)
6/30/2006	241,017,483	8,261,575	11,313,637	(3,052,062)	(1.27%)
6/30/2007	279,618,100	8,535,103	12,180,422	(3,645,319)	(1.30%)
6/30/2008	259,479,803	8,525,981	12,936,189	(4,410,208)	(1.70%)
6/30/2009	205,033,476	9,073,382	13,450,493	(4,377,111)	(2.13%)
6/30/2010	229,574,640	10,403,865	13,756,761	(3,352,896)	(1.46%)
6/30/2011	278,146,750	10,433,680	14,951,984	(4,518,304)	(1.62%)
6/30/2012	278,311,367	12,983,827	15,159,390	(2,175,563)	(0.78%)
6/30/2013	309,589,784	12,622,461	16,928,305	(4,305,844)	(1.39%)
6/30/2014	357,316,892	12,887,225	20,010,413	(7,123,188)	(1.99%)
6/30/2015	363,922,631	12,826,689	19,458,540	(6,631,851)	(1.82%)
6/30/2016	361,155,486	11,419,059	19,576,376	(8,157,317)	(2.26%)
6/30/2017	397,137,172	11,554,062	24,139,604	(12,585,542)	(3.17%)
6/30/2018	420,683,030	13,567,863	23,828,680	(10,260,817)	(2.44%)
6/30/2019	436,611,997	13,403,910	24,953,776	(11,549,866)	(2.65%)

*Note: Years prior to 6/30/2013 were provided by the prior actuary.*



**TABLE 13**  
**(continued)**

**STATE PATROL RETIREMENT SYSTEM**  
**HISTORICAL CASH FLOWS**

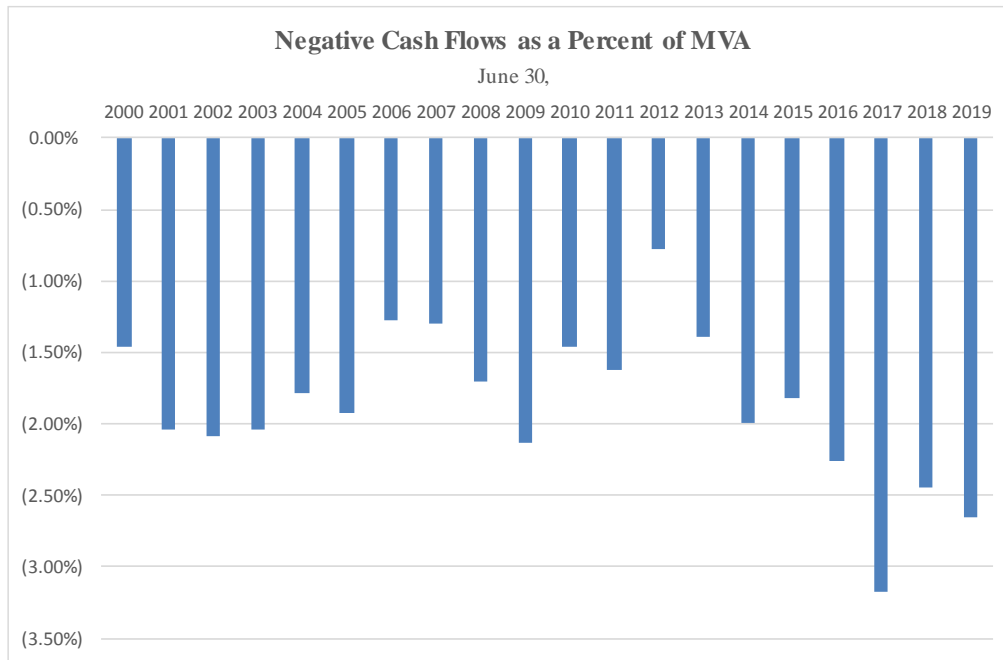




TABLE 14

## STATE PATROL RETIREMENT SYSTEM

## LIABILITY MATURITY MEASUREMENTS

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members (see Table 15) and a growing percentage of retiree liability (see table below). With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system because it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Actuarial Valuation Date	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a) / (b)
July 1, 2000	\$100,715,316	\$169,545,801	59.4%
July 1, 2001	108,936,849	187,284,490	58.2%
July 1, 2002	114,847,016	197,615,091	58.1%
July 1, 2003	122,452,596	210,930,784	58.1%
July 1, 2004	130,817,914	222,161,512	58.9%
July 1, 2005	137,890,496	236,026,471	58.4%
July 1, 2006	151,774,452	245,373,102	61.9%
July 1, 2007	162,565,102	265,846,597	61.1%
July 1, 2008	171,898,267	291,996,719	58.9%
July 1, 2009	186,078,948	305,291,065	61.0%
July 1, 2010	201,734,175	321,901,446	62.7%
July 1, 2011	210,595,076	339,554,456	62.0%
July 1, 2012	232,413,652	362,298,975	64.1%
July 1, 2013	246,649,393	386,875,100	63.8%
July 1, 2014	263,401,639	401,415,518	65.6%
July 1, 2015	272,309,342	410,210,579	66.4%
July 1, 2016	279,581,643	421,923,380	66.3%
July 1, 2017	303,829,524	465,066,035	65.3%
July 1, 2018	307,996,815	480,092,201	64.2%
July 1, 2019	315,463,480	496,519,265	63.5%

*Note: Years prior to July 1, 2013 were provided by the prior actuary.*

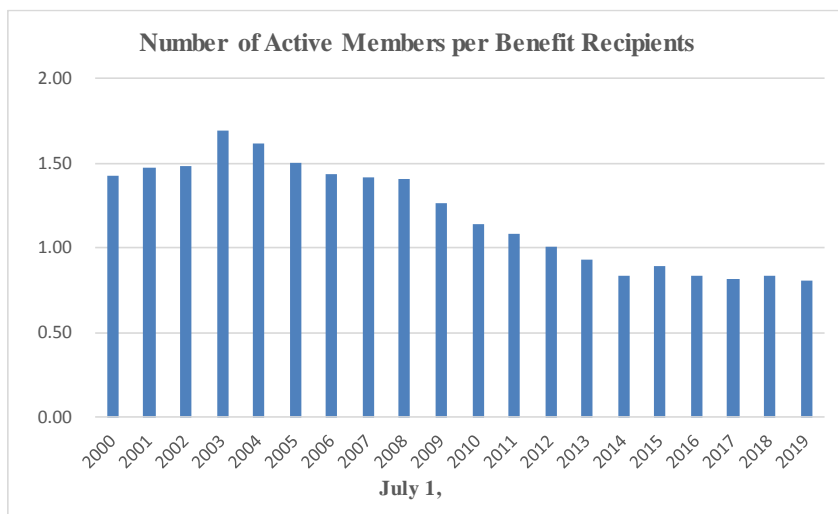




**TABLE 15**  
**STATE PATROL RETIREMENT SYSTEM**  
**Active and Retiree Membership**

Valuation Date July 1,	Number of Active Members	Number of Retired Members	Active/Retired
2000	386	269	1.43
2001	403	274	1.47
2002	415	280	1.48
2003	486	288	1.69
2004	489	301	1.62
2005	473	316	1.50
2006	477	331	1.44
2007	484	341	1.42
2008	496	352	1.41
2009	468	372	1.26
2010	444	390	1.14
2011	433	402	1.08
2012	427	422	1.01
2013	409	438	0.93
2014	378	453	0.83
2015	413	464	0.89
2016	393	471	0.83
2017	391	478	0.82
2018	395	478	0.83
2019	397	488	0.81

*Note: Years prior to July 1, 2013 were provided by the prior actuary.*





**TABLE 16**  
**STATE PATROL RETIREMENT SYSTEM**  
**HISTORICAL MEMBER STATISTICS**

This exhibit compares the key July 1, 2019 valuation results under five (5) different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

<b>Investment Return Assumption</b>	<b>7.00%</b>	<b>7.25%</b>	<b>7.50%</b>	<b>7.75%</b>	<b>8.00%</b>
<b>Contributions</b>					
Normal Cost Rate	34.45%	32.33%	30.38%	28.57%	26.89%
UAAL Amortization Rate	20.36%	17.83%	15.29%	12.73%	10.16%
Total Actuarial Required Contribution	54.81%	50.16%	45.67%	41.30%	37.05%
Weighted Member Contribution Rate	(16.11%)	(16.11%)	(16.11%)	(16.11%)	(16.11%)
Weighted Employer Contribution Rate	(16.11%)	(16.11%)	(16.11%)	(16.11%)	(16.11%)
Additional Required State Contribution Rate	22.59%	17.94%	13.45%	9.08%	4.83%
<b>Additional Required State Contribution</b> <b>(\$ in thousands)</b>	\$6,908	\$5,486	\$4,113	\$2,777	\$1,477
<b>Actuarial Value of Assets</b>	\$433,656	\$433,656	\$433,656	\$433,656	\$433,656
<b>Actuarial Accrued Liability</b>	528,867	512,272	496,519	481,554	467,328
<b>Unfunded Actuarial Accrued Liability*</b>	\$95,211	\$78,617	\$62,864	\$47,899	\$33,673
<b>Funded Ratio</b>	82.00%	84.65%	87.34%	90.05%	92.79%

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.

\*Numbers may not add due to rounding.



## **SECTION 7 – HISTORICAL FUNDING AND OTHER INFORMATION**

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This section of the report provides a historical perspective on the System’s funding and contribution practices, along with other information that may be of interest.



**SECTION 7 – HISTORICAL FUNDING AND OTHER INFORMATION**

**TABLE 17**  
**STATE PATROL RETIREMENT SYSTEM**  
**HISTORICAL FUNDING INFORMATION**  
**SCHEDULE OF FUNDING PROGRESS**

<b>Actuarial Valuation Date</b>	<b>Actuarial Value of Assets (a)</b>	<b>Actuarial Accrued Liability (AAL) (b)</b>	<b>Unfunded Actuarial Accrued Liability (UAAL) (b - a)</b>	<b>Funded Ratio (a / b)</b>	<b>Covered Payroll (c)</b>	<b>UAAL as a % of Covered Payroll [(b - a) / c]</b>
June 30, 2003	\$214,657,454	\$210,930,784	(\$3,726,670)	101.8%	\$21,929,399	(17.0%)
June 30, 2004	216,422,556	222,161,512	5,738,956	97.4%	22,640,907	25.3%
June 30, 2005	219,831,273	236,026,471	16,195,198	93.1%	22,882,413	70.8%
June 30, 2006	231,740,772	245,373,102	13,632,330	94.4%	24,057,960	56.7%
June 30, 2007	254,662,819	265,846,597	11,183,778	95.8%	26,072,859	42.9%
June 30, 2008	273,393,928	291,996,719	18,602,791	93.6%	26,979,643	69.0%
June 30, 2009	274,119,906	305,291,065	31,171,159	89.8%	25,922,439	120.2%
June 30, 2010	273,306,925	321,901,446	48,594,521	84.9%	26,765,816	181.6%
June 30, 2011	279,192,669	339,554,456	60,361,787	82.2%	26,195,473	230.4%
June 30, 2012	282,810,785	362,298,975	79,488,190	78.1%	25,794,219	308.2%
June 30, 2013	294,468,029	386,875,100	92,407,071	76.1%	27,417,644	337.0%
June 30, 2014	325,966,725	401,415,518	75,448,793	81.2%	25,933,848	290.9%
June 30, 2015	356,446,470	410,210,579	53,764,109	86.9%	28,422,706	189.2%
June 30, 2016	374,205,616	421,923,380	47,717,764	88.7%	27,806,977	171.6%
June 30, 2017	395,149,596	465,066,035	69,916,439	85.0%	28,629,936	244.2%
June 30, 2018	417,588,175	480,092,201	62,504,026	87.0%	29,795,799	209.8%
June 30, 2019	433,655,500	496,519,265	62,863,765	87.3%	30,578,962	205.6%

Note: Information before 2013 was produced by the prior actuary.



**TABLE 18**  
**STATE PATROL RETIREMENT SYSTEM**  
**HISTORICAL FUNDING INFORMATION**  
**SCHEDULE OF CONTRIBUTIONS FROM THE EMPLOYER**

<b>Plan Year Ending</b>	<b>Actuarial Required Contributions</b>	<b>Percent Contributed</b>
June 30, 2005	\$ 4,121,155	77%
June 30, 2006	5,081,930	100%
June 30, 2007	5,058,621	100%
June 30, 2008	4,855,700	100%
June 30, 2009	5,384,789	100%
June 30, 2010	6,260,122	100%
June 30, 2011	7,563,126	79%
June 30, 2012	7,774,506	100%
June 30, 2013	9,768,585	77%
June 30, 2014	8,752,627	100%
June 30, 2015	8,073,824	100%
June 30, 2016	7,053,408	100%
June 30, 2017	7,053,110	100%
June 30, 2018	8,952,649	100%
June 30, 2019	8,693,805	100%

Note: Contribution information is consistent with that shown in the GASB 67 report prepared for the System.



**APPENDIX A – MEMBERSHIP DATA**

**MEMBER DATA RECONCILIATION**

	Active Members	Members in DROP	Inactive Vested	Inactive Non-vested	Retirees and Beneficiaries	Disabled Members	Total
As of July 1, 2018	395	33	28	8	431	14	909
Changes in status							
a) Retirement	(5)	(13)	(2)	0	20	0	0
b) DROP	(5)	5	0	0	0	0	0
c) Death	(1)	0	0	0	(9)	0	(10)
d) Non-vested terminations	(1)	0	0	1	0	0	0
e) Vested terminations	0	0	0	0	0	0	0
f) Contribution refund	0	0	(2)	(2)	0	0	(4)
g) Beneficiaries in receipt	0	0	0	0	6	0	6
h) Disability retirements	(1)	0	0	0	0	1	0
i) Return to active service	1	0	(1)	0	0	0	0
j) Expired benefits	0	0	0	0	0	0	0
Total changes in status	(12)	(8)	(5)	(1)	17	1	(8)
New entrants	14	0	0	0	0	0	14
Data Corrections	0	0	0	0	0	0	0
Net Change	2	(8)	(5)	(1)	17	1	6
As of July 1, 2019	397	25	23	7	448	15	915



**APPENDIX A – MEMBERSHIP DATA**

**SUMMARY OF MEMBERSHIP DATA**

<b>A. ACTIVE MEMBERS</b>	<b>July 1, 2019</b>	<b>July 1, 2018</b>	<b>% Change</b>
1. Number of Active Members			
(a) Before assumed retirement age	385	388	(0.8%)
(b) Beyond assumed retirement age	12	7	71.4%
(c) Total	<u>397</u>	<u>395</u>	0.5%
2. Annual Reported Salary			
(a) Before assumed retirement age	\$ 27,792,524	\$ 27,576,026	0.8%
(b) Beyond assumed retirement age	1,179,501	644,521	83.0%
(c) Total	<u>\$ 28,972,025</u>	<u>\$ 28,220,547</u>	2.7%
3. Accumulated Contributions	\$ 50,077,492	\$ 46,520,462	7.6%
4. Active Member Averages			
(a) Age	41.0	40.8	0.5%
(b) Service	14.0	13.6	2.9%
(c) Compensation	\$ 72,977	\$ 71,444	2.1%
(d) Accumulated contributions	\$ 126,140	\$ 117,773	7.1%
<b>B. INACTIVE MEMBERS</b>			
1. Number of Inactive Members			
(a) System vested	7	8	(12.5%)
(b) System nonvested (refund only)	23	28	(17.9%)
(c) Total	<u>30</u>	<u>36</u>	(16.7%)
2. Accumulated Member Contributions	\$ 2,623,612	\$ 3,274,519	(19.9%)
3. Inactive Members Averages			
(a) Age (vested members only)	45.7	44.7	2.2%
(b) Accumulated member contributions	\$ 87,454	\$ 90,959	(3.9%)
<b>C. RETIREES, DISABLEDS, AND BENEFICIARIES</b>			
1. Number of Members			
(a) Retired	354	339	4.4%
(b) Disabled	15	14	7.1%
(c) Beneficiaries	94	92	2.2%
(d) DROP	25	33	(24.2%)
(e) Total	<u>488</u>	<u>478</u>	2.1%
2. Annual Benefits			
(a) Retired	\$ 18,848,430	\$ 17,671,350	6.7%
(b) Disabled	543,714	489,262	11.1%
(c) Beneficiaries	2,527,577	2,434,084	3.8%
(d) DROP	1,613,519	2,047,570	(21.2%)
(e) Total	<u>\$ 23,533,240</u>	<u>\$ 22,642,266</u>	3.9%
3. Market Value of DROP Account Balances	\$ 4,444,988	\$ 6,126,048	(27.4%)

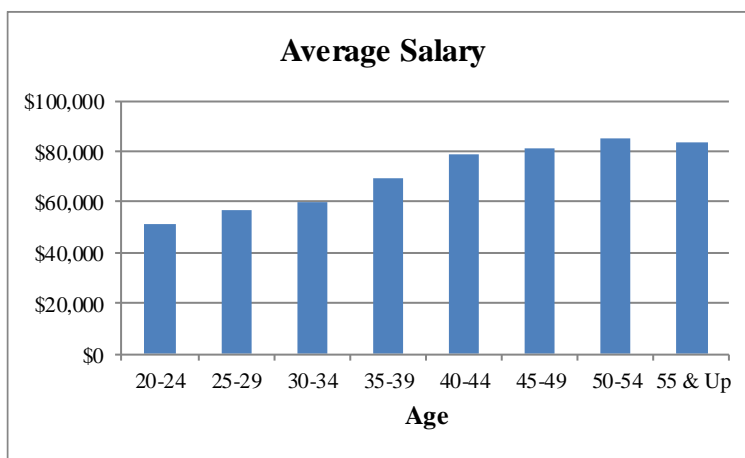
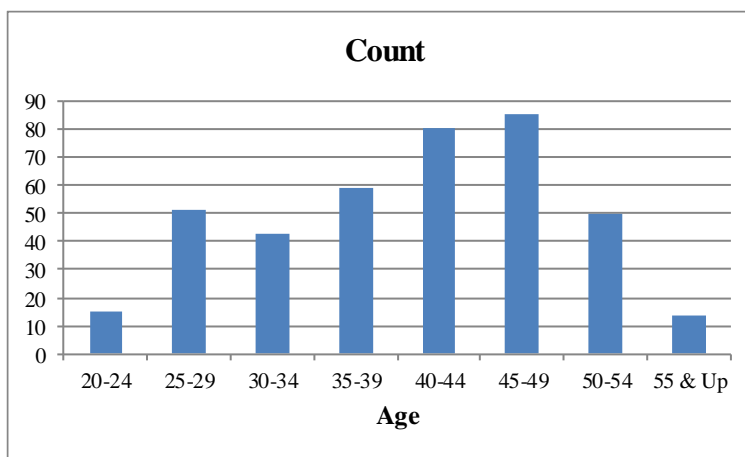


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JULY 1, 2019**

**Total**

<u>Age</u>	<u>Count</u>			<u>Reported FY 2019 Earnings</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
20-24	14	1	15	\$ 714,175	\$ 50,567	\$ 764,742
25-29	47	4	51	2,661,844	232,479	2,894,323
30-34	37	6	43	2,240,045	337,937	2,577,982
35-39	55	4	59	3,823,673	262,065	4,085,738
40-44	75	5	80	5,900,331	379,799	6,280,130
45-49	82	3	85	6,701,655	220,811	6,922,466
50-54	50	0	50	4,274,559	0	4,274,559
55 & Up	13	1	14	1,100,066	72,019	1,172,085
<b>Total</b>	<b>373</b>	<b>24</b>	<b>397</b>	<b>\$ 27,416,348</b>	<b>\$ 1,555,677</b>	<b>\$ 28,972,025</b>





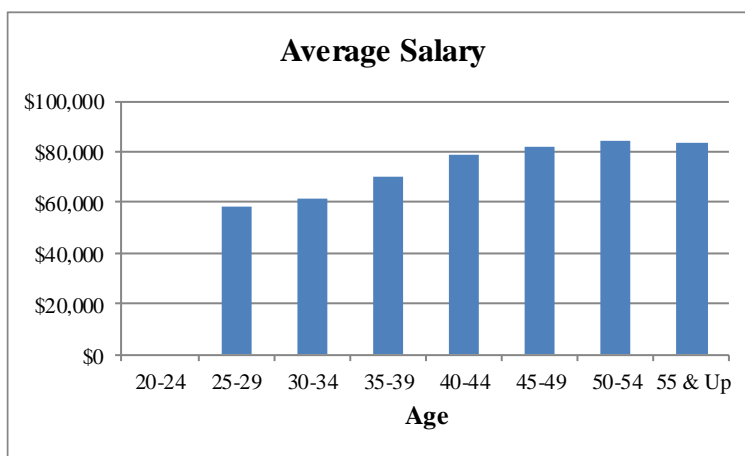
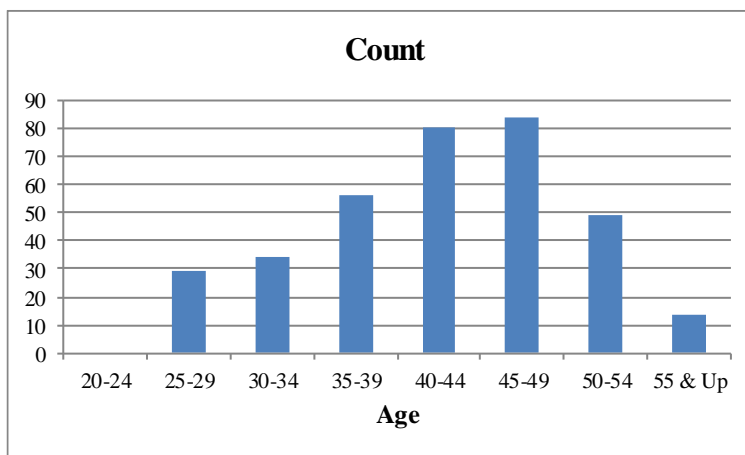


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JULY 1, 2019**

**Tier 1**

<u>Age</u>	<u>Count</u>			<u>Reported FY 2019 Earnings</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
20-24	0	0	0	\$ 0	\$ 0	\$ 0
25-29	28	1	29	1,629,161	61,115	1,690,276
30-34	28	6	34	1,762,415	337,937	2,100,352
35-39	53	3	56	3,718,672	208,289	3,926,961
40-44	75	5	80	5,900,331	379,799	6,280,130
45-49	81	3	84	6,640,394	220,811	6,861,205
50-54	49	0	49	4,123,437	0	4,123,437
55 & Up	13	1	14	1,100,066	72,019	1,172,085
<b>Total</b>	<b>327</b>	<b>19</b>	<b>346</b>	<b>\$ 24,874,476</b>	<b>\$ 1,279,970</b>	<b>\$ 26,154,446</b>



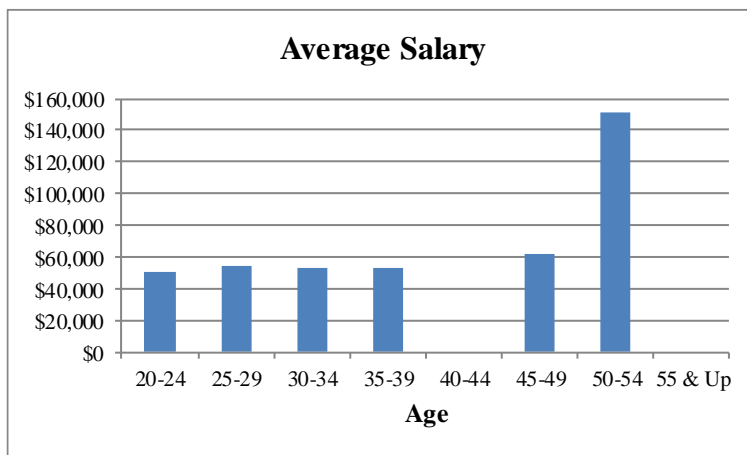
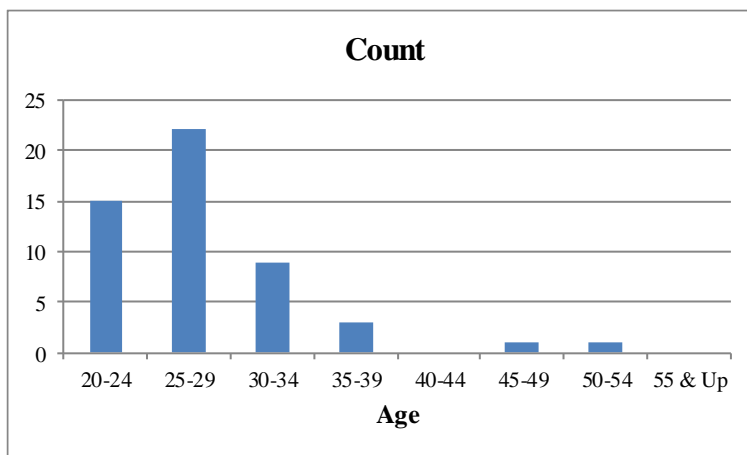


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JULY 1, 2019**

**Tier 2**

<u>Age</u>	<u>Count</u>			<u>Reported FY 2019 Earnings</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
20-24	14	1	15	\$ 714,175	\$ 50,567	\$ 764,742
25-29	19	3	22	1,032,683	171,364	1,204,047
30-34	9	0	9	477,630	0	477,630
35-39	2	1	3	105,001	53,776	158,777
40-44	0	0	0	0	0	0
45-49	1	0	1	61,261	0	61,261
50-54	1	0	1	151,122	0	151,122
55 & Up	0	0	0	0	0	0
<b>Total</b>	<b>46</b>	<b>5</b>	<b>51</b>	<b>\$ 2,541,872</b>	<b>\$ 275,707</b>	<b>\$ 2,817,579</b>





APPENDIX A – MEMBERSHIP DATA

AGE AND SERVICE DISTRIBUTION  
AS OF JULY 1, 2019

Age		0-4	5-9	10-14	15-19	20-24	Over 25	Total
<b>20-24</b>	Number	15	0	0	0	0	0	15
	Total Salary	\$ 764,742	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 764,742
	Average Sal.	\$ 50,983	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 50,983
<b>25-29</b>	Number	49	2	0	0	0	0	51
	Total Salary	\$ 2,764,483	\$ 129,840	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,894,323
	Average Sal.	\$ 56,418	\$ 64,920	\$ 0	\$ 0	\$ 0	\$ 0	\$ 56,751
<b>30-34</b>	Number	25	14	4	0	0	0	43
	Total Salary	\$ 1,408,303	\$ 906,548	\$ 263,131	\$ 0	\$ 0	\$ 0	\$ 2,577,982
	Average Sal.	\$ 56,332	\$ 64,753	\$ 65,783	\$ 0	\$ 0	\$ 0	\$ 59,953
<b>35-39</b>	Number	6	5	39	9	0	0	59
	Total Salary	\$ 329,048	\$ 312,900	\$ 2,717,441	\$ 726,349	\$ 0	\$ 0	\$ 4,085,738
	Average Sal.	\$ 54,841	\$ 62,580	\$ 69,678	\$ 80,705	\$ 0	\$ 0	\$ 69,250
<b>40-44</b>	Number	0	4	8	63	5	0	80
	Total Salary	\$ 0	\$ 262,789	\$ 564,654	\$ 4,995,796	\$ 456,891	\$ 0	\$ 6,280,130
	Average Sal.	\$ 0	\$ 65,697	\$ 70,582	\$ 79,298	\$ 91,378	\$ 0	\$ 78,502
<b>45-49</b>	Number	1	1	7	33	38	5	85
	Total Salary	\$ 61,261	\$ 59,524	\$ 474,803	\$ 2,616,359	\$ 3,291,119	\$ 419,400	\$ 6,922,466
	Average Sal.	\$ 61,261	\$ 59,524	\$ 67,829	\$ 79,284	\$ 86,608	\$ 83,880	\$ 81,441
<b>50-54</b>	Number	1	0	1	20	20	8	50
	Total Salary	\$ 151,122	\$ 0	\$ 63,108	\$ 1,581,180	\$ 1,685,501	\$ 793,648	\$ 4,274,559
	Average Sal.	\$ 151,122	\$ 0	\$ 63,108	\$ 79,059	\$ 84,275	\$ 99,206	\$ 85,491
<b>55 &amp; Up</b>	Number	0	0	0	6	6	2	14
	Total Salary	\$ 0	\$ 0	\$ 0	\$ 483,450	\$ 487,642	\$ 200,993	\$ 1,172,085
	Average Sal.	\$ 0	\$ 0	\$ 0	\$ 80,575	\$ 81,274	\$ 100,497	\$ 83,720
<b>Total</b>	Number	97	26	59	131	69	15	397
	Total Salary	\$ 5,478,959	\$ 1,671,601	\$ 4,083,137	\$ 10,403,134	\$ 5,921,153	\$ 1,414,041	\$ 28,972,025
	Average Sal.	\$ 56,484	\$ 64,292	\$ 69,206	\$ 79,413	\$ 85,814	\$ 94,269	\$ 72,977



**APPENDIX A – MEMBERSHIP DATA**

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**MEMBERS PARTICIPATING IN DROP  
AS OF JULY 1, 2019**

<u>Age</u>	<u>Count</u>			<u>Annual Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
49 & Under	0	0	0	\$ 0	\$ 0	\$ 0
50-51	5	3	8	339,255	200,045	539,300
52-53	5	0	5	308,411	0	308,411
54-55	5	0	5	312,506	0	312,506
56-57	2	0	2	129,096	0	129,096
58-59	5	0	5	324,206	0	324,206
60 & Up	0	0	0	0	0	0
Total	22	3	25	\$ 1,413,474	\$ 200,045	\$ 1,613,519



**APPENDIX A – MEMBERSHIP DATA**

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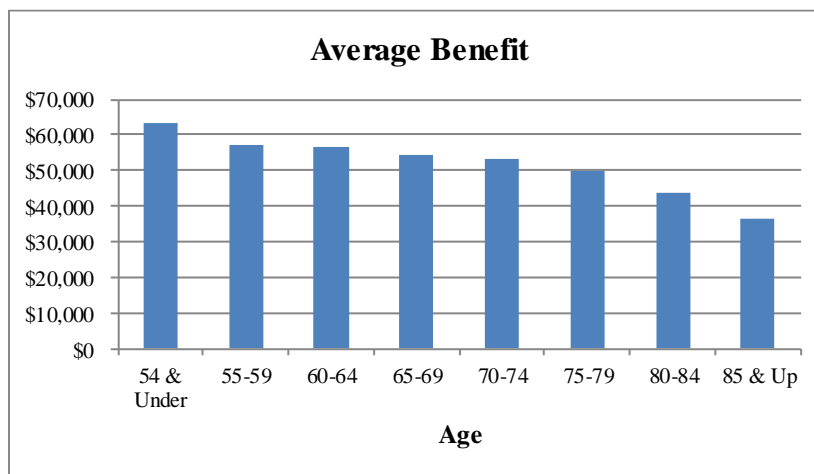
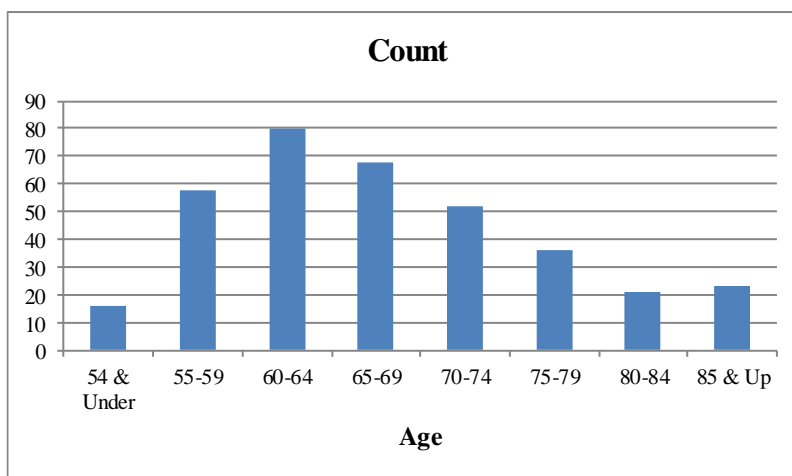
**INACTIVE VESTED MEMBERS  
AS OF JULY 1, 2019**

<u>Age</u>	<u>Count</u>			<u>Annual Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
20-24	0	0	0	\$ 0	\$ 0	\$ 0
25-29	0	0	0	0	0	0
30-34	0	0	0	0	0	0
35-39	2	0	2	28,028	0	28,028
40-44	9	0	9	232,752	0	232,752
45-49	9	0	9	250,723	0	250,723
50-54	2	0	2	41,993	0	41,993
55 & Up	1	0	1	28,477	0	28,477
Total	23	0	23	\$ 581,973	\$ 0	\$ 581,973



**RETIRED MEMBERS  
AS OF JULY 1, 2019**

Age	Count			Annual Benefits		
	Male	Female	Total	Male	Female	Total
54 & Under	15	1	16	\$ 947,821	\$ 63,760	\$ 1,011,581
55-59	53	5	58	3,024,916	302,689	3,327,605
60-64	74	6	80	4,194,734	327,574	4,522,308
65-69	66	2	68	3,631,330	51,244	3,682,574
70-74	51	1	52	2,694,330	62,575	2,756,905
75-79	36	0	36	1,799,661	0	1,799,661
80-84	21	0	21	914,452	0	914,452
85 & Up	23	0	23	833,344	0	833,344
<b>Total</b>	<b>339</b>	<b>15</b>	<b>354</b>	<b>\$18,040,588</b>	<b>\$807,842</b>	<b>\$18,848,430</b>

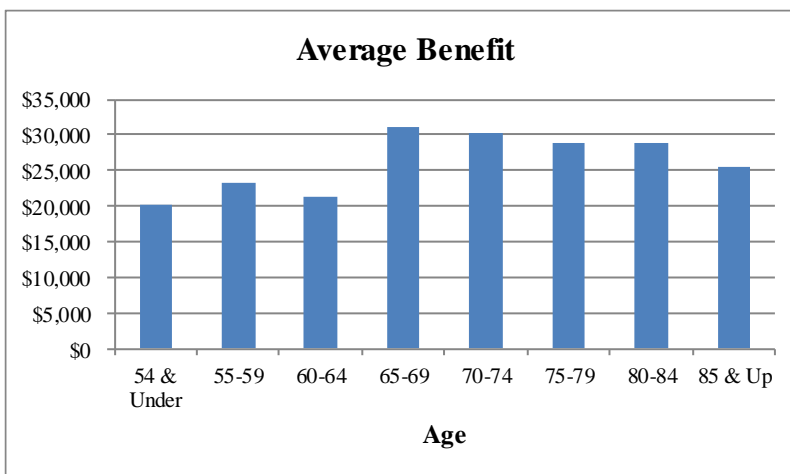
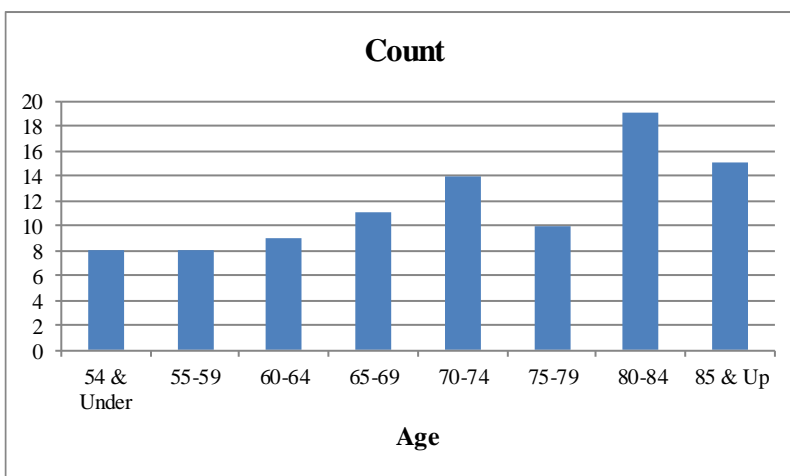




**APPENDIX A – MEMBERSHIP DATA**

**BENEFICIARIES  
AS OF JULY 1, 2019**

Age	Count			Annual Benefits		
	Male	Female	Total	Male	Female	Total
54 & Under	1	7	8	\$ 21,484	\$ 140,039	\$ 161,523
55-59	0	8	8	0	186,839	186,839
60-64	0	9	9	0	191,840	191,840
65-69	0	11	11	0	343,287	343,287
70-74	0	14	14	0	424,965	424,965
75-79	0	10	10	0	288,707	288,707
80-84	1	18	19	31,612	517,318	548,930
85 & Up	0	15	15	0	381,486	381,486
<b>Total</b>	<b>2</b>	<b>92</b>	<b>94</b>	<b>\$ 53,096</b>	<b>\$ 2,474,481</b>	<b>\$ 2,527,577</b>





**APPENDIX A – MEMBERSHIP DATA**

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**DISABLED MEMBERS  
AS OF JULY 1, 2019**

Age	Count			Annual Benefits		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
54 & Under	5	1	6	\$ 176,258	\$ 29,996	\$ 206,254
55-59	0	0	0	0	0	0
60-64	0	1	1	0	36,473	36,473
65-69	4	0	4	149,543	0	149,543
70-74	3	0	3	118,373	0	118,373
75-79	0	0	0	0	0	0
80-84	0	0	0	0	0	0
85 & Up	1	0	1	33,071	0	33,071
Total	13	2	15	\$ 477,245	\$ 66,469	\$ 543,714





## APPENDIX B – SUMMARY OF PLAN PROVISIONS

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<b>Member</b>	Any member of the Nebraska State Patrol, permanent force.
<b>Participation Date</b>	Date of becoming a member.
<b>Benefit Tiers</b>	<p>Tier 1 refers to participants who joined the plan prior to July 1, 2016.</p> <p>Tier 2 refers to participants who joined the plan on or after July 1, 2016, as well as Tier 1 participants who took a refund and returned to the plan on or after July 1, 2016.</p>
<b>Definitions</b>	
<i>Covered pay</i>	Gross annual earnings subject to contributions.
<i>Final average compensation</i>	<p>For Tier 1 participants, it is the average of the highest three 12-month periods of covered pay, ending on the earlier of the participant's termination date or retirement date.</p> <p>For Tier 2 participants, it is the average of the highest five 12-month periods of covered pay, ending on the earlier of the participant's termination date or retirement date.</p>
<i>Salary caps</i>	For Tier 2 participants only, increases in compensation during the final five plan years of employment will be capped at 8% per year.
<i>Pension service</i>	Length of service includes all service with the Nebraska State Patrol, permanent force, computed to the nearest one-twelfth year, plus declared emergency service in the armed forces.
<i>Fiscal year</i>	Twelve month period ending June 30.
<i>Member and employer contributions</i>	<p>Tier 1 participants contribute 16.0% of covered pay. Such contributions are credited with interest based on the 1-year treasury yield curve on July 1 of each year, as determined by State Statutes. Employer contributions on Tier 1 Covered Pay are 16.0% of monthly salary. (Prior to July 1, 2013, employee and employer contribution rates for Tier 1 members were 19.0% of pay.).</p> <p>Tier 2 participants contribute 17.0% of covered pay. Such contributions are credited with interest based on the 1-year treasury yield curve on July 1 of each year, as determined by State Statutes. Employer contributions on Tier 2 Covered Pay are 17.0% of monthly salary.</p> <p>The State makes any additional contributions that are actuarially required.</p>



## APPENDIX B – SUMMARY OF PLAN PROVISIONS

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*Pension benefit* 3.0% of Final Average Compensation times Pension Service. The benefit is subject to a maximum of 75% of Final Average Compensation. Effective July 1, 2001, an automatic annual cost-of-living adjustment (COLA) equal to the CPI-W index is granted to each participant who has been retired for at least one full fiscal year.

For Tier 1 participants, the COLA is capped at 2.5%, unless the benefit drops below 60% of the purchasing power of the original benefit. For Tier 2 participants, the COLA is capped at 1.0% and there is no purchasing power floor.

*Normal Retirement Date (NRD)* First of month coinciding with or next following (a) the completion of 25 years of service and attaining age 50, (b) the completion of ten years of service and attaining age 55, or (c) attaining age 60 regardless of service.

### **Eligibility for Benefits**

*Deferred vested* Termination for reasons other than death, disability, or retirement after completing at least six years of pension service.

*Disability retirement* Retirement by reason of disability as defined by State Statutes.

*Early retirement* Retirement before NRD and on or after both attaining age 50 and completing ten years of pension service.

*Normal retirement* Retire on NRD.

*Postponed retirement* Retire after NRD.

*Post-retirement death benefit* Death after retirement with surviving spouse or dependent children under age 19. For non-disability retirement, the surviving spouse must have been married to the member at the date of retirement.

*Pre-retirement death benefit* Death prior to retirement.

### **Monthly Benefits Paid Upon the Following Events**

*Normal retirement* Pension benefit determined as of NRD.

*Early retirement* Pension benefit determined as of early retirement date, reduced by 5/9% for each month that commencement (which must be after age 50 and ten years of service) of payment precedes the earlier of age 55 or completion of 25 years of service. No reduction is made after 25 years of service.

*Postponed retirement* Monthly pension benefit determined as of actual retirement date.



**APPENDIX B – SUMMARY OF PLAN PROVISIONS**

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*Termination with deferred vested benefit*

Refund of contributions with regular interest or a percentage of the pension benefit determined as of termination date, reduced by 5/9% for each month that commencement (which must be after age 50 and ten years of service) of payment precedes the earlier of age 55 or completion of 25 years of service. This percentage is based upon completed years of pension service as follows:

<u>Years</u>	<u>Vested Percentage</u>
5 and under	0%
6	20
7	40
8	60
9	80
10 or more	100

*Disability retirement*

A monthly benefit equal to 50% of current monthly salary at the date of disablement for members with less than 17 years of service.

For members with more than 17 years of service, a monthly benefit equal to the product of 3% of final monthly salary, times total years of service subject to a maximum of 75% of Final Average Compensation.

*Pre-retirement death benefits*

**Surviving spouse or dependent children under age 19:**

Benefit is computed as if member retired for disability on the date of death. This benefit is payable to the surviving spouse as long as spouse has dependent children under age 19. If spouse dies or remarries, 75% of this benefit continues to children until the youngest attains age 19. If there are no dependent children under age 19, 75% of this benefit is payable to the surviving spouse until death or remarriage.

**No surviving spouse or dependent children under age 19:**

A lump sum equal to the member’s contributions plus regular interest.

*Post-retirement death benefits*

100% of member’s annuity is payable to the surviving spouse provided spouse has dependent children under 19. If there is no surviving spouse or spouse dies or remarries, 75% of member’s annuity continues to children until the youngest attains age 19. If there are no dependent children under age 19, 75% of member’s annuity continues to surviving spouse.

*Forms of payment*

Normal form is 75% Joint and Survivor benefit. Members may also elect a refund of contributions. If there is no surviving spouse or dependent children under age 19, the member’s accumulated contributions with interest are paid to the beneficiary or estate.



## APPENDIX B – SUMMARY OF PLAN PROVISIONS

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### *Deferred Retirement Option Plan (DROP)*

A Tier 1 member may elect to participate in the DROP after they attain age 50 with 25 years of service. A member can continue to work while participating in the DROP, but must terminate employment within 5 years of entry into the DROP. The member's retirement benefits would be calculated as of the DROP entry date. The monthly payments that begin at entry into the DROP are accumulated until the member terminates service, at which time the DROP accumulated benefits and investment income can be paid as a lump sum, rollover or annuity. The COLA for retirees would not apply to the member during participation in the DROP and both the member and employer contributions cease upon entry into the DROP.

Tier 2 members cannot participate in DROP.

### **Benefits Reflected in Valuation**

All benefits were valued, including future cost of living increases granted by statute.

### **Plan Provisions Effective After July 1, 2019**

No future changes in plan provisions were recognized in determining the funded status or in determining the actuarial soundness of statutory contribution levels.

### **Changes in Plan Provisions Since the Prior Year**

There have been no changes to plan provisions since the prior year.



## ACTUARIAL METHODS

- 1. Calculation of Normal cost and Actuarial Accrued Liability:** The method used to determine the normal cost and actuarial accrued liability was the Entry Age Actuarial Cost Method described below.

### Entry Age Actuarial Cost Method

Projected pension and preretirement spouse's death benefits were determined for all active members who had not reached age 60 or 25 years of service. Cost factors designed to produce annual costs as a level percentage of each member's expected compensation in each year from the assumed entry age to the assumed retirement age were applied to the projected benefits to determine the normal cost (the portion of the total cost of the plan allocated to the current year under the method). The normal cost is determined by summing intermediate results for active members who had not reached age 60 or 25 years of service and determining an average normal cost rate which is then related to the total payroll of active members who had not reached age 60 or 25 years of service. The actuarial assumptions shown in Appendix C were used in determining the projected benefits and cost factors. The actuarial accrued liability for active members (the portion of the total cost of the plan allocated to prior years under the method) was determined as the excess of the actuarial present value of projected benefits over the actuarial present value of future normal costs.

The actuarial accrued liability for retired members and their beneficiaries currently receiving benefits, active members who either reached age 60 or 25 years of service, terminated vested members and disabled members not yet receiving benefits was determined as the actuarial present value of the benefits to be paid. No future normal costs are payable for these members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that would have been accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of plan assets measured on the valuation date. Under the Entry Age Normal method, experience gains or losses, i.e., decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

The unfunded actuarial accrued liability was reinitialized as of July 1, 2006 and amortized over a closed 30-year period. At subsequent valuation dates, amortization bases equal to changes in the unfunded actuarial accrued liability were established and amortized using a level-dollar payment method over a closed 30-year period. Effective with the July 1, 2013 valuation, amortization payments were recalculated to amortize the remaining bases as a level-percent of expected payroll, and the unfunded actuarial accrued liability is amortized using the "layered" approach. Changes in the unfunded actuarial accrued liability due to assumption changes or actuarial experience gains/losses are amortized over separate 30-year amortization bases, each with their own individual payment schedules. The UAAL amortization payment schedules are determined using the level percent of payroll methodology where payments escalate annually with the assumed increase in payroll growth. If the unfunded actuarial accrued liability was \$0 or less as of the prior valuation date, all previous amortization bases are considered fully amortized.



## APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

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**2. Calculation of the Actuarial Value of Assets:** The actuarial value of assets is based on a five-year smoothing method and is determined by spreading the effect of each year's investment return in excess of or below the expected return. The market value of assets as the valuation date is reduced by the sum of the following:

- i. 80% of the return to be spread during the first year preceding the valuation date,
- ii. 60% of the return to be spread during the second year preceding the valuation date,
- iii. 40% of the return to be spread during the third year preceding the valuation date, and
- iv. 20% of the return to be spread during the fourth year preceding the valuation date.

The return to be spread is the difference between (1) the actual investment return on market value of assets and (2) the expected return of actuarial value of assets.

### Changes in Methods and Procedures Since the Prior Year

There have been no changes to the methods and procedures since the prior year.

## VALUATION PROCEDURES

### Data Procedures

Salaries for first year members are annualized by NPERS and reflected in the Calculated Salary field in the census data. This is used in the valuation process for new members. For continuing active members, the Accumulated Salary field from the data, representing the actual salary earned in the prior fiscal year, is used in the valuation process.

When multiple records are received, the record with the oldest beneficiary date of birth is valued.

### Other Valuation Procedures

The compensation amounts used in the projection of benefits and liabilities for active members were prior plan year compensations. Salary increases are assumed to apply to annual amounts.

Projected benefits were limited by the dollar limitation required by the Internal Revenue Code Section 415 as it applies to governmental plans and compensation limited by Section 401(a)(17).

Decrementations are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrementations.

No actuarial accrued liability is included for participants who terminated without being vested prior to the valuation date, except those who are owed a refund of contributions.



**APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS**

**ECONOMIC ASSUMPTIONS**

- 1. Investment Return 7.50% per annum, compounded annually, net of expenses.
- 2. Inflation 2.75% per annum, compounded annually.
- 3. Salary Increase Rates vary by service. Sample rates are as follows:

Rates by Service	
Years	Rate*
<1	9.0%
5	6.1
10	5.1
15	5.0
20	5.0
25	5.0
30	3.5

- 4. Payroll Growth 3.50% per annum.
- 5. Interest on Employee Contributions 3.00% per annum, compounded annually.
- 6. Increases on Compensation And Benefit Limits 2.75% per annum on the 401(a)(17) compensation limit and the 415 benefit limit.

**DEMOGRAPHIC ASSUMPTIONS**

- 1. Mortality
  - a. Healthy lives - Active members RP-2014 White Collar Table for Employees (100% of male rates for males, 55% of female rates for females), projected generationally with MP-2015.
  - b. Healthy lives – Retired members and beneficiaries RP-2014 White Collar Table for Employees, set back two years, scaled (males: under 80, 1.008; over 80, 1.449; females: under 85, .924; over 85, 1.5855; geometrically blended), projected generationally from 2013 with a Society of Actuaries (SOA) projection scale tool using 0.5% ultimate 2035 rate in 2035.
  - c. Disabled lives RP-2014 Disabled Lives Table (static table).



**APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS**

d. Healthy mortality rates and life expectancies are shown below at sample ages:

<b>Pre-retirement Mortality</b>		
<b>Sample Age</b>	<b>Mortality Rate</b>	
	<b>Males</b>	<b>Females</b>
20	0.03%	0.01%
30	0.03	0.01
40	0.04	0.02
50	0.12	0.05
60	0.33	0.11

<b>Post-retirement Mortality</b>		
<b>Sample Age</b>	<b>Mortality Rate</b>	
	<b>Males</b>	<b>Females</b>
50	0.23%	0.17%
60	0.47	0.31
70	1.03	0.82
80	3.65	2.28
90	14.57	12.63

<b>Projection Scale – Post-retirement Mortality</b>						
<b>Sample Age</b>	<b>Scale (2020)</b>		<b>Scale (2030)</b>		<b>Scale (2040)</b>	
	<b>Males</b>	<b>Females</b>	<b>Males</b>	<b>Females</b>	<b>Males</b>	<b>Females</b>
50	0.0252	0.0144	0.0080	0.0052	0.0050	0.0050
60	0.0083	0.0051	0.0066	0.0059	0.0050	0.0050
70	0.0088	0.0121	0.0061	0.0057	0.0050	0.0050
80	0.0114	0.0104	0.0057	0.0058	0.0050	0.0050
90	0.0109	0.0104	0.0057	0.0057	0.0046	0.0046

e. Disabled mortality rates are shown below at sample ages:

<b>Sample Age</b>	<b>Males</b>	<b>Females</b>
30	0.79%	0.30%
40	1.10	0.55
50	2.04	1.19
60	2.66	1.70
70	4.03	2.82
80	7.66	6.10





**APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS**

2. Retirement

Retirement is assumed to occur upon attaining certain age and service requirements. The retirement assumption varies depending on benefit eligibility and age at retirement.

Early/Normal Retirement Eligibility	Age and Service Requirements	Retirement Assumption
Reduced	Age 50 Service: 10 years	3% at each age
Unreduced	Age 55 Service: 10 years	10% at each age
Unreduced (Eligible for DROP)	Age 50 Service: 25 years	100% at each age
Unreduced (Mandatory)	Age 60	100% at each age

3. Termination

Rates vary by service. Sample rates are as follows:

Rates by Service	
Years	Rate
<1	4.00%
1	3.75
5	2.75
10	2.00
15	1.25
20+	0.00

4. Disability

Rates vary by age. Sample rates are as follows:

Rates by Age	
Age	Rate
25	0.08%
30	0.10
35	0.13
40	0.20
45	0.31
50	0.52
55	0.91
60	1.36



## APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

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### OTHER ASSUMPTIONS

- |                               |   |
|-------------------------------|---|
| 1. Form of Payment            | 75% Joint & Survivor Annuity. Deferred vesteds are assumed to take the greater of the present value of an annuity at earliest unreduced eligibility or a refund of contributions.   |
| 2. Marital Status             |   |
| a. Percent married            | 100% married  |
| b. Spouse's age               | Females assumed to be three years younger than males.   |
| 3. Children                   | All members are assumed to have one dependent child at death or retirement. The child is assumed to be 28 years younger than the member, and is assumed to always survive until age 19.   |
| 4. Administrative Expense     | Investment return is assumed to be net of investment and administrative expenses.   |
| 5. Cost of living adjustments | 2.25% per annum, compounded annually for Tier 1 members.<br>1.00% per annum, compounded annually for Tier 2 members.  |
| 6. DROP participation         | All members elect the DROP at the earliest possible date and remain in the DROP for 4 years or to age 60, if earlier.   |
| 7. State Contribution         | Additional State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements. |

### **Changes in Assumptions since the Prior Year**

There have been no changes to the assumptions since the prior year.



## APPENDIX D – GLOSSARY OF TERMS

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<b>Actuarial Accrued Liability</b>	The difference between the actuarial present value of system benefits and the actuarial value of future normal costs. Also referred to as “accrued liability” or “actuarial liability”.
<b>Actuarial Assumptions</b>	Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
<b>Accrued Service</b>	Service credited under the system which was rendered before the date of the actuarial valuation.
<b>Actuarial Equivalent</b>	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate assumptions.
<b>Actuarial Cost Method</b>	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of retirement system benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the “actuarial funding method”.
<b>Experience Gain (Loss)</b>	The difference between actual experience and actuarial assumptions anticipated experience during the period between two actuarial valuation dates.
<b>Actuarial Present Value</b>	The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest and by probabilities of payment.
<b>Amortization</b>	Paying off an interest-discounted amount with periodic payments of interest and principal, as opposed to paying off with lump sum payment.
<b>Normal Cost</b>	The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.
<b>Unfunded Actuarial Accrued Liability</b>	The difference between actuarial accrued liability and the valuation assets. Sometimes referred to as “unfunded actuarial liability” or “unfunded accrued liability.”